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GENERAL VIEW
OF THE
AGRICULTURE
AND
DOMESTIC ECONOMY
OF
SOUTH WALES;

CONTAINING THE COUNTIES OF

BRECON,	GLAMORGAN,
CAERMARTHEN,	PEMBROKE,
CARDIGAN,	RADNOR.

DRAWN UP FOR THE CONSIDERATION OF
THE BOARD OF AGRICULTURE
AND INTERNAL IMPROVEMENT.

BY WALTER DAVIES, A.M.

VOL. II.

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CONTENTS.

CHAP. IX. GARDENS AND ORCHARDS.

	PAGE
SECT. 1. Gardens,	1
2. Orchards, Fruits, &c.	5

CHAP. X. WOODS AND PLANTATIONS.

SECT. 1. Woods,	19
-----------------------	----

CHAP. XI. WASTES, 68

CHAP. XII. IMPROVEMENTS, 117

SECT. 1. Draining,	118
2. Faring and burning,	132
3. Manuring,	140
4. Weeding,	194
5. Irrigation,	195
6. Clearing away stones from land,	203

CHAP. XIII. LIVE STOCK.

SECT. 1. Cattle,	205
2. Sheep,	243
3. Horses,	275
4. Hogs,	280
5. Rabbits,	282
6. Poultry,	282
7. Pigeons,	282
8. Bees,	282

CONTENTS.

CHAP. XIV. RURAL ECONOMY.

	PAGE
Labour, Servants, Labourers, &c.	283
Provisions,	291
Fuel,	314

CHAP. XV. POLITICAL ECONOMY;

CONNECTED WITH, OR AFFECTING AGRICULTURE.

Roads,	366
Bridges,	392
Canals,	395
Fairs,	411
Weekly Markets,	415
Commerce,	418
Manufactures,	438
The Poor,	466
Population,	475

XVI. OBSTACLES TO IMPROVEMENT, 480

CONTENTS.

v

CONCLUSION.

	PAGE
Means of Improvement, and the Measures calculated for	
that purpose,	507

APPENDIX.

No. I. Some further Account of the Cardiganshire	
Mines, beginning north on the Dovey, and	
ending south on the Towy,	509
II. Extract of a Letter from the Rev. Thomas	
Alban, of Ludlow, to D. E. Lewis Lloyd,	
Esq. of Dôl Haidd, on the feasibility and	
utility of planting Orchards in Cardiganshire,	519

ERRATA.

ERRATA.

(Note), *for* Appendix VI. *read* Appendix II.
last line, *for* foregoing, *read* following.
last paragraph, *for* regular, *read* irregular.
4th ditto, *for* 14 to 11 lb, *read* 14 to 18 lb.
4th ditto, *for* 40 to 15, *read* 10 to 15 score.
1st ditto, inverted commas *for* a quotation wanted.
4th ditto, *for* uncommon, *read* common.
14th bridge—Newport-bridge consists of five arches: the middle arch of 70 feet span; the four other arches are 62 feet span each.

AGRICULTURAL SURVEY
OF
SOUTH WALES.

CHAP. IX.

GARDENS AND ORCHARDS.

SECT. I.—GARDENS.

“SO totally blind are the tenants to the advantage of any *green crops*, and so powerful is the effect of habitual idleness, that they scarce raise any thing even for family use in their *gardens*, which, on the approach of winter, are generally left open to the *ingress* and *egress* of the sheep and cattle!”—*Mr. Clark, in Orig. Rep. of Brecknockshire*, p. 52.

The above stricture, levelled against the inhabitants of the hilly district of the county, is true only of a few poor mountaineers; and to such, in every other county, under similar circumstances, it may be equally applicable. Such gardens are not secured with quick-fences, and potatoes are nearly the whole of the vegetables they cultivate: they are however few, compared with

the gardens that are well preserved and cultivated, and those few gradually decrease in number.

“The kitchen gardens are productive, when well managed. All culinary vegetables and wall-fruit thrive in the lower part of Radnorshire, as well as in the adjoining county of Hereford; but not so in the colder and higher parts.”—*Rev. W. J. Rees.*

In both these respects, Brecknockshire seems as it were a counterpart of Radnorshire.

Persons of fortune, in every part of the district, are upon a par with those similarly circumstanced in other parts of the island; in having gardens exhibiting taste, and producing plenty. The fruit-gardens are, in most places, excellent; the productions in great plenty, and of the best flavour.

The gardens of mere farmers are in general well stored with the more useful vegetables, or such as supply the table in regular succession throughout the season.

“As to cottage gardens, the lowlanders, of course, generally take the lead; and among them, such as are of Silurian, seem to surpass those of Dimetian extraction, in cottage horticulture. In the gardens of West Wales, we find kitchen vegetables in plenty and perfection. Cottagers, however, are not here as fond of gardening as they are in the eastern parts of South Wales, where we always find a pleasing mixture of flower and kitchen garden, with such fruits as are in such gardens cultivated with feasibility,—gooseberries, currants, raspberries, &c. Potatoes, in West Wales, and not improperly, are the great object of cottage horticulture: not that there are nothing else to be met with in such gardens; but these prevail so much, that every thing else is on a smaller scale than in other places.”

“The

"The genial climature of the maritime coast of South Wales is favourable to horticulture. Here we find the productions of the kitchen, flower, and fruit garden, as early, and in as great perfection, as in any part of Britain. Vegetation commences early in the spring; considerably more so than in the eastern and midland counties: yet it has been observed, that vegetation in the midland counties, though later in its commencement, is more rapid than in the western parts of the island. Leaves appear sooner in the western parts; but flowers and fruit will be as early in the midland districts: the beauties of spring appear earlier in the western counties: the fruits of summer, however, are not earlier, at least but very little: fruits ripen generally much about the same time in every part of South Britain: the difference appears chiefly in the earliness of spring, the long continuance of verdure in autumn, and the mildness of winter, which are experienced in the western climature."—*E. W.*

The leek, *allium porrum* (the *porrum sativum* of Ray and Miller), in Welsh pl. *cennin*, has been adopted by the Welsh as a national badge of distinction, analogous to the Irish *shamrock*. Tradition, and perhaps history, attribute the origin of this national badge to a feat of our metropolitan patron-saint; but we would rather refer it to a prior date—to a victory obtained by the Silurian chieftain, Caractacus, before his final subjugation by Ostorius. Still, there is scarcely a cottage garden in Siluria (Glamorganshire, Monmouthshire, &c.) without a proportionate large bed of leeks; some of which are earthed up like celery; and thereby are blanched, and rendered mild and tender: to be used not only as a condiment, but sometimes as an aliment. From this peculiar diet, whether the

Silurian Welsh are more free from nephritic complaints than the Dimetian and Venedotian Welsh, we are not, at present, prepared to form an opinion. About the year 1720, the taste of the Silurian Welsh for alliaceous plants, and especially the leek, is commemorated by D. T. in his enumeration of the respective diets peculiar to each county: the Silurian soup then was, and still is, *cawl cennin*; on the contrary, the Dimetian soup then was, and still is, *cawl erwin**.

The kitchen-gardens of the market-men at Llandaff, near Cardiff, are numerous and productive; supplying the most convenient parts of South Wales, and in a certain proportion the Bristol market, with vegetables: such a group of gardens for the accommodation of the public, we have not noticed elsewhere within the district.

To enumerate the several articles of the first-rate gardens, would be to write in part a botanical dictionary: the crops of a farmer's garden consist of the vegetables most appropriate to his table, viz. early po-

* *Cawl erwin*, a soup wherein turnips and other mild vegetables are the chief ingredients: *cawl cennin*, a soup flavoured by the admixture of leeks. The peculiar Venedotian soup is *cawl llaeth*, or milk soup.

"Mewn piceynau *cawl y cennin*."—D. T. in Glamorganshire.

"*Cawl y cennin*—diod ddigon."—D. T. in Monmouthshire.

"A *sbawl erwin yn ei dymmor*."—D. T. in Caermarthenshire.

"Caws, ymenyn, a *sbawl erwin*."—D. T. in Cardiganshire.

Other alliaceous plants cultivated in Welsh gardens, are, 1. *Allium ascalonicum*, shallot or eschalotte; 2. *Allium cepa*, common onion, varieties; 3. *Allium fistulosum*, ciboule, or the Welsh onion; 4. *Allium schenoprasum*, cives, or chives: these four are cultivated for the purposes of diet; 5. *Allium sativum*, common garlic; 6. *Allium scorodoprasum*, or rocambole, with bulbs at the tops of the stalks, as well as root bulbs; the two latter chiefly for medicinal uses. The more common name of the *allium fistulosum*, or Welsh onion, is *boly-leek*, owing probably to its being at first introduced by some holy monk.

tatoes, yellow turnips, early and winter cabbages, greens, varieties of pease and beans, carrots, onions, and other alliaceous plants, and varieties of salads; to which some add brocoli, cauliflowers, asparagus, sea-kale, rhubarb.

Some thrifty cottagers aim at most of these, especially near towns and manufacturing places. Parsnips (*Ulysium gwyddelig*), a common ingredient formerly in the All-Saints-Eve dish, are now but rarely cultivated.

SECT. II.—ORCHARDS, FRUIT, &c.

Radnorshire and Brecknockshire lower.—"The orchards which are planted thrive very well, and produce cyder of a good quality, both in flavour and strength."—*Rev. W. J. Rees.*

"Here are many thriving orchards: the red-streak, a common apple; the broad-tail, greatly recommended for all soils, especially that which is gravelly. Several farmers make from 20 to 30 hogsheads of very good cyder. Here are a few nurseries of fruit-trees, where apple-trees sell for from 18*d.* to 2*s.* per tree. Most people buy stocks, and graft thereon their own choice of fruits: crabstocks sometimes sell from 1*s.* to 18*d.* each. This is by far too high, as they are so cheaply raised from core."—*Mr. Weyman.*

In the Vale of Wye, adjoining Herefordshire, exclusive of orchards properly so called, and well planted, apple-trees are found in intermediate rows in hop-yards, and among forest trees in sideland places. Several cottages are enriched with the useful appendages of small orchards. The late Rev. Mr. Hughes of

Glasbury, was an active and zealous orchard-planter. To remedy the prevailing degeneracy of apple-trees, he introduced grafts from vigorous-bearing trees, of the choicest cyder sorts, from the isle of Jersey, Normandy, &c.

In the Vale of Usk, and the minor valleys connected with it, orchards are in the same kind of request as in the Vale of Wye, &c. Near Crickhowell we saw an entire orchard, consisting of pear-trees.

There is very little cyder made in South Wales, excepting in the eastern parts of these two counties.

Monmouthshire is the only county in South Wales* noticed by D. T. in his Welsh Topography, first published about 1720, as producing *cyder*. The topographer very methodically divides his survey of each county into five sections: he appropriates the first to geographical state and circumstances, soil, surface, &c.; the second, to natural productions, mines, woods, live stock, &c.; the third, to provincial diet, provisions, &c.; the fourth, to the physical and moral character of the inhabitants; and the fifth, to the domestic and manufacturing occupations of the female class. Of the latter he says in Monmouthshire: "The women

* In jurisprudence, and other political arrangements, Monmouthshire has been considered by some as an English county since the reign of Henry VIII: but the Welsh still enumerate thirteen counties within their Principality—"Tair iŵr ar ddeg Cymru." Monmouthshire is no more to be considered as an English county, because it is included in the Oxford circuit, than the three counties in North Wales, Flint, Denbigh, and Montgomery, because they are within the Chester circuit. Monmouthshire still retains more of its Welsh characteristics, in language, customs, and manners, than Radnorshire. The Welsh language is so far from being on the decline, that it is spoken more fluently, and in greater purity, at this day, on the borders of England, and even in parts of the counties of Salop and Hereford, than it has been for these two centuries back.

here are employed in manufacturing some fine flannels, in managing cyder from the numerous orchards, and in making hats from wheat-straw*."

Southern Limestone Tract, Maritime Coasts, &c.—George Owen, in his History of Pembrokeshire, in the reign of Elizabeth, complains of the eight chief wants of the county in his time: 1. Want of *Orchards* and *Hop-yards*; 2. Scarcity of Timber and Wood; 3. Want of Enclosures; 4. Want of good Schools; 5. Want of bringing Live Stock to weekly markets; 6. Want of Fish-ponds; 7. Want of Woollen Manufactories; 8. Want of a better Breed of Horses. Of these eight wants, the first only is appropriated to this Section: his words on the subject are these:

"The greatest want that this countrey accounteth itself to have, is *fruite*, as *apples*, *peares*, *warders*, *plums*, *apricocks*, *wall nuts*, and such like, whereof there is small store or none at all: which want, although it may be thought partly to proceede of the nature of the soile not being naturally apt to nourish wood, yet certen it is as much by negligence of the inhabitants, in not planting, preserving, and cherishing of *fruite* trees; for it is found by experience, that in diverse places there are found good *orchards*, well thriving and proving; for although the countrey be much bordering on the sea, and subject to the vehement flowes thereof in the winter season, which nippe and make the naked bushes to stoope, yet there are few or noe villages but

* "Gwaith y merched hyn yn union,

"Nyddu rhai gwlanenni meinion,

"Trin seidr o'r per llanau teufriith,

"A gweithio hetiau gwellt y gwenith."

Hanc: Tair Sir ar ddeg Cymru.

the same is sheltered from the winds, by some hilly land, and in such valleys the fruit-timber are found to be very fruitfull, and especially in old tyme about religious houses, as also gentlemen's houses, and by divers good husbandmen's houses, not only orchards stored with all kinde of fruit-timber, but alsoe about most houses of account, and countrie villages, pretie groves of wood, as the ashe, maple, elme, and such like; and divers rare timber, as the pine-apple* tree, the spruce and firre trees, the mulberry-tree, and others; which tax our country people of great negligence in this point."

About a century after Mr. George Owen's days, Mr. Lewis, the Annotator upon his manuscript history, says: "I am persuaded by experience, that the lack of fruit-trees, as well as all kinds of timber, is more owing to the neglect of planting, than any constitutional unaptness in the soil of this country; for I have lived to see extensive groves and orchards of my own planting; and from the produce of the latter, have for some years past made a considerable store of cyder annually, although my situation is open to the sea, and not remarkably sheltered; and I wish I could influence the practice of others, and beget a more general cultivation of orchards and hop-gardens, as I find the hops I raise, no way inferior to those of Kent or Worcestershire."

Another century has elapsed since the days of the above Annotator; and the wants complained of a century before his time, have not yet been fully supplied. *Orchards* still are not numerous in the county. Near the mansions of the gentry, at Oriulton, &c. we find orchards, but not every where. There are a few about

* Was the pine-apple fir introduced here so early?

Pembroke. We were agreeably surprised to find the large and fine village of St. Dogmael's (*Llandudoch*), on the Pembrokeshire side of the Teivy, having its houses neatly whitewashed, as if a colony from Glamorgan had formerly settled there, and an orchard of apples, pears, plums, &c. attached to each house, the only instance of the kind we met with in West Wales. There was formerly a pretty large abbey at this place: some of its ruins still remain; by which its style of architecture seems to have been superior to any we have seen in the county, excepting that of St. David's. The neatness of this village, and its numerous orchards, may be attributed to the abbots and monks, who were commonly the patrons of improvements wherever they resided.

The western valleys of Cardiganshire, fertile and well sheltered, are highly favourable to the production of fruit. Orchards prosper in the Vale of Teivy, from Llanbyddar down to the sea below Cardigan, as at Llandyssul, Pen y Wenallt, Llwyn-dyrus, Pen y Lan, &c. E.W. never saw finer peaches, or ripened in greater perfection, than in the Rev. Mr. Millingchamp's fine fruit-garden at Trevor. In the garden of R. Warren Jones, Esq. of Llanina, we saw trees covered with a second crop of blossoms in September, after having borne a full crop of early apples*.

"The reason that orchards appear not more numerous in West Wales, is possibly an idea or persuasion, that they would not grow in places exposed to the sea air; and this is probably inferred from observing, that many trees, even natives of other parts of the same tract, would not grow near the sea: but nothing can be

* See a tract on *Orchards in Cardiganshire*, in the Appendix, No. VI.

a greater

a greater mistake. The apple-tree is one of the few that bear the sea air well, or are but very little affected by it. As a proof of this, we may instance the Vale of Glamorgan, where orchards flourish on the most elevated grounds on the very margin of the shore; as about the villages of Roose, Fontugary, Porthkerry, East Aberthaw, and many others, lying between the harbour of Aberthaw and Barry. These orchards are very near the brink of the high sea cliffs, with a considerable slope towards the south-west, than which no exposure can be more in the stroke of the sea air from the Atlantic: but, even here, fruit ripens well, and blights occur less frequently than in more inland places. All kinds of apples, however, do not equally bear the sea air, though the exceptions are but few. The writer of this article has a small orchard within a quarter of a mile of the southernmost coast at Aberthaw: the royal russet, Wheeler's russet, Pyle's russet, the gilliflower, Hervey, aromatic pippin, and indeed all kinds of the very best apples, are most of them not at all affected by the sea air, or not materially: the Kirton pippin tree, however, is nipped on the western side, as if a little clipped; but it bears well, and the fruit is excellent*.

"It has been observed and well ascertained in Glamorgan, that fruits ripen in the sea air earlier, and in a higher degree of perfection, than in the more inland parts. The same kind of peach in a garden within a quarter of a mile of the sea-shore, ripens a week, or more, earlier than in a good aspect on the very same kind of soil, and equally well managed, in a garden five miles distant from the shore. Orchards along the

* Is not the Kirton pippin more exposed to the western winds than the other trees?—W. D.

sea-shore, ripen their fruit sooner, and in higher perfection, than those further up the country in the very same kind of soil: it is also observed, that in gardens and orchards near the sea, the fruit, though sooner ripe, is never so large as in the more inland parts.

"On the limestone tract, in Gower, there were formerly a great number of orchards: small orchards are still pretty frequent there, and produce abundance of apples."—*E. W.*

The limestone tract of Castle Martin in Pembroke-shire is similarly circumstanced as to soil and sea air: and though orchards are here less frequent, yet there are in a few places luxuriant evidences of the genialness of both soil and climate for the production of fruit; as at Stackpole Court, Brownslade, Orierton, &c. &c.

"One hot-house in Castle Martin, will produce more and finer grapes than perhaps any half a dozen in the county of Middlesex."—*Mr. Milne, Stackpole Court.*

"The wall-fruit in Castle Martin seldom fail: when the trees have cast their blossoms, and the weather dry, so as to endanger the crops, the gardeners every day constantly water the trees by means of forcing pistons: the moisture thus afforded, and the physical action of the water, are supposed to have generally the desired effect of preventing blights."—*Mr. Mirchouse.*

It is to be hoped, that the time is not far distant, when orchard-planting will meet with the attention it deserves; and that not a farm or a cottage will be found in well-adapted situations, without an orchard proportionate to the wants and comforts of the family; with a surplus of fruit for the supply of those whose lot has placed them in situations where orchards are not expected to prosper. Such unfavourable situations, we are persuaded, are far less numerous than is commonly imagined.

imagined. A thick belt of evergreens should be planted between the orchard and the more adverse winds, in situations somewhat exposed: and for the encouragement of planters, in such situations, it has been observed, that orchards on grounds of some elevation, have escaped blights, and cropped well, when those in the neighbouring lower vales have been injured by them. The soil for orchards, where not naturally fertile, should be improved by previous culture. Rich virgin mould agrees best with fruit-trees of all sorts, whether in preparing ground for planting, or for subsequently dressing them. Where rich mould is not procurable, resort must be had to composts. Dung composts should be so worked, that not a particle of the dung be visible. A little lime added to virgin earth, in dressing the ground for fruit-trees, is very beneficial: which is best applied in a compost of lime and earth previously prepared. Ashes of fern, nettles, bean-stalks, &c. added to such earth, has also been found useful; but dung, in a too recent state, is to fruit-trees the rankest poison. Some bare the roots of apple trees, &c. in winter, and apply carrion. An old man at St. Dogmael's informed us, that in former times, when herrings were to be had exceedingly cheap, they buried them about the roots of the apple trees, which improved them greatly in their growth and health.

In an economical view, an orchard supplies an excellent article of provision, in various shapes, for the farmer's family. On a dairy farm, scalded or roasted apples in curds made from whey, is a favourite repast in warm weather: this saves a portion of bread. Apples are also made into round pies, called *turn-ups*, to be carried out into the fields, for the labourers' baits or meals: this saves cheese.

Besides

Besides the comforts or delicacies they afford, orchards may be so planted, and in such dispositions, as to be highly ornamental to the residence of a gentleman, or even of a cottager.

The planting of orchards is already become more feasible, even in the western parts; as nurserymen are establishing themselves in the country, to supply its demand for forest-trees, fruit-trees, and stocks for grafting; and proprietors of estates see their interest as well as their accommodation, in encouraging such useful settlers among them.

Orchards might well be an object of attention to Agricultural Societies; even independent Orchard Associations might be established in different and appropriate parts of the country: cottagers to have a certain number of trees, according to the capacity of their gardens, *gratis*; but to pay to the treasurer of the association 2s. for every tree that dies.

Were orchards more common in West Wales, the time and labour of men and horses would be saved, who are now employed, in autumn, in conveying apples, in panniers, from East Wales; which, when arrived at their destination, are sold high, and chiefly consumed in being eaten raw. In East Wales, in years of plenty, some time back, orchard fruit was exceedingly cheap. The crop of an apple tree, twenty-five hundred, is remembered to have been sold for 3*d.* a hundred, of six score and six; and pears, of an inferior sort, for about 10*d.* per Winchester bushel.

The *writer* of this article has dwelt with peculiar pleasure on the subject of this Section; for he is persuaded that, had it not been for the profits of an orchard, it is possible, if not probable, that he would not have been able to write at all: *Myrddyn*, perhaps,
in

in the sixth century, wrote his *Avallenau*, or the Orchard Poem, under a less strong stimulus and impression.

Evergreen Shelter preferable to that of High Walls.—"Many gardens in the neighbourhood, as to soil and aspect, are nearly the same, but much less productive than this at Cathay*: it is presumed therefore, that the uncommon fruitfulness of this garden, may be justly ascribed principally to shelter.

"The peaches and nectarines on the wall, blossom from the beginning to the middle of March; apples, pears, &c. a month later; a season of the year when the equinoctial gales are frequent: the blossoms therefore of such fruit-trees as are exposed to them, would be blown off before setting, were they not sheltered; whilst by being sheltered, they are benefited by those strong currents of air, moderated by passing through the evergreens. The current of air falls violently over a high wall; and at the angle of incidence does more mischief than if it had not been checked.

"In transplanting half-grown evergreens, and other trees, care must be taken to bring as much roots and soil with them as possible; and also that their aspect be not changed, that the north and south sides of the trees be as before: this is aiding the operations of Nature, and not counteracting them.

"Transplant evergreens and shrubs in October and March; and all young fruit-trees and forest-trees in November, and early in December*."

"A kitchen-garden in Glamorganshire, exposed as

* Cathay, is near Cardiff in Glamorganshire.

† Meteorological Tracts, by Colonel Capper.

much as it possibly could be to the sea air, and within about a hundred yards of the high-water mark, had many of the vegetables growing in it materially injured by the sea or westerly winds. The gardener conceived the idea of planting the cuttings of the abele, or Dutch poplar, in thick rows: these grew up rapidly, and formed effectual skreens, that effectually protected every thing from the effects of the sea air, which did not appear in the least to affect the poplars: in the same garden, and in the fullest exposures, peaches, nectarines, apricots, plums, and pears, prospered greatly, producing plenty of well and early-ripened fruit."—*E. W.*

Orangery.—There is but one complete orangery in South Wales, and that at Margam Abbey in Glamorganshire. The proprietors, the Mansels, and their heirs in the maternal line, the Talbots, it appears have preserved no family documents respecting the first introduction of this celebrated plantation. Tradition, as usual upon such occasions, fills up the blank; but, as usual also, replete with contrarieties. The original cargo is said to have consisted of orange and lemon trees. *One tradition* attributes it to the wreck of a ship on the coast, belonging to the Spanish Armada; this is highly improbable: *another* reports that it was brought from Italy by Sir Henry Wotton for King Charles I.: a *third* says, that a queen of Portugal intended it as a present to a northern monarch, king of either Sweden or Denmark. The Rev. Dr. Hunt, who is resident on the spot, in his very excellent account of Margam, communicated to Mr. Carlisle, and inserted in his Topographical Dictionary of Wales, notices a manuscript journal preserved in the library

library at Badminton, recording a journey of the Duke of Beaufort through South Wales, and his reception by Sir Edward Mansel at Margam Abbey, on the 16th of August, 1684. His Grace not noticing the *orangery*, whilst he minutely describes circumstances and objects of less curiosity, makes Dr. Hunt to conclude that the orangery was not then in existence at Margam. This corroborates a *fourth* tradition, that these foreign fruit-trees were sent from Portugal by a Dutch merchant, as a present to the latter Queen Mary, whom he probably wished to compliment as the consort of his Stadtholder: and as all the traditions agree in one point, namely, that the ship conveying the fruit-trees was wrecked on the coast of Margam, it may have happened in one of the first years after the Revolution of 1688. It is moreover reported, that Queen Anne made a formal grant of the orangery to Sir Thomas Mansel, Bart. who was comptroller of Her Majesty's household, and afterwards raised to the peerage; and that he annually made a present of fruit from Margam to Her Majesty. Whether this be fact or not, is uncertain: it seems, however, much more certain, that the Queen could not have placed the orangery in more careful hands, nor have entailed it upon a more favourable spot.

However, the plants were secured from the wreck, whenever it happened, and were cultivated in a green-house, erected for the purpose, 150 feet in length, with stoves, and a handsome pavilion in the centre. The present possessor, Thomas Mansel Talbot, Esq. in the year 1787, built a new green-house, in a most superb style, with a handsome Doric front; and in the year 1800, a conservatory, with flues in the ground, 150 feet long. The green-house is 270 feet long, 30
broad

broad within the walls, and 20 high; and connected with a transverse pavilion at each end, of 52 feet more, making the whole length 327 feet. The pavilions are repositories of models and antiques: among others, Diomedæ carrying away the Trojan Palladium, the Farnesian Hercules, Brutus, Tiberius Cæsar, Lucius Verus, the Eleusinian Mysteries, an elegant model of the Barberini Vase; the Temple of Cybele at Tivoli, the Amphitheatre at Rome, the Triumphal Arch of Titus Vespasian, the head of a Gladiator, Pope Ganganelli, Lewis XIV. Painting by Michael Angelo, &c. &c.

The present collection of fruit-trees consists of Seville, China, cedrat, mandarin, pomegranate, curled-leaved, and nutmeg oranges; lemons, citrons, shadocks, and bergamots: we measured some of the latter, that were 17 inches in circumference.

The trees in the green-house are all standards, planted in square boxes, to be removed during summer into the open air in an extensive area; surrounded by numerous forest trees and shrubs, tulip trees, acacias, bay trees, arbutus, Portugal laurels, hollies, stone pines, &c. of the most luxuriant vegetation; and a circular pond in the centre for occasional watering. The moveable fruit-trees are in number about 110, and many of them are 18 feet high. There are about 40 in the conservatory, planted in the natural earth, and traced against a trellis framing, where the fruits abound, and attain their native size and excellence.

These fruit-trees are propagated by what gardeners term *circumposition*. The finest branches are selected for the process; and in April in the green-house, or in June in the open air, a narrow ring of the bark is marked with a knife, and peeled off. The branch is

then made to pass through a round aperture in the bottom of a wooden box about nine inches square: the box is suspended at the proper elevation by being nailed to a stake prop, and then filled with fertile mould; the aperture being made water proof, with a cement of clay or dough. The soil in the box is occasionally watered; and in a given time the branch will have struck root in the box; it is then cut underneath the box, and transplanted for a separate standard.

“Giraldus Cambrensis informs us, that, in his time, there was a *vineyard* at Maenor Byr, in Pembrokeshire, which produced good grapes, and from which good wine was made. Vineyards are also said by ancient writers to have been common in Glamorgan and Gwent; why are they not still to be found in those counties? We frequently see the front of a cottage in Glamorgan, covered with a vine, producing good grapes: several spots still bear the name of *gwinllan*, and *vineyard*; and even popular tradition asserts, that vineyards were once common there,”—*E. W.*

CHAP. X.
WOODS AND PLANTATIONS.

SECT. I.—WOODS.

IT appears from old deeds, that estates were formerly sold at an inferior price, in consequence of their being crowded with timber. The times are now so far changed, that a few straggling trees, and even coppices of saplings, are to be taken at an exclusive valuation, by the purchasers of estates by auction.

The scarcity of navy timber must have first been felt in the most accessible parts of the island; and from the shores it spread in every direction, towards the interior, until, after having pervaded the whole, it met in the central parts. Tracts, once the best wooded, may still be considered as such, owing to the situations being favourable to the production of successions of timber. Apprehensions were afloat thirty years back, that the country had been exhausted of its oak timber; though, nevertheless, in the well wooded parts of Wales, each succeeding year produces numerous falls of navy and other timber; but as the demand increases, and the means of home supply decreases, there is still a foundation for an apprehension that the *ne plus ultra* period must be near at hand. The present extraordinary price of oak timber and bark, causes half, and even less than quarter grown trees, to be doomed to the axe. Trees of very small dimensions are sawed

c 2

though

through and through into scanty planks, without any distinction being made by the ship-wrights between sap and heart of oak. This must the more rapidly increase the evil; it increases the demand by the perishableness of the materials, and decreases the means of supply by the premature falling of sapling trees. In parts contiguous, and in other places convenient for water carriage, the preservation of woods is not attended to any farther than their being of a sufficient size for poles for the extensive collieries of Pembrokehire, and other parts of South Wales; especially the southern range of coal, and the northern side also, as far as the stone coal extends, that is, to Hirwaun, east of the river Neath; and from thence eastward into Monmouthshire, where the coaking and binding coals obtain, the roofs are sufficiently strong to support themselves without timber props, &c. Sapling poles for the collieries, sell for about 8s. 9s. and from that to 12s. a dozen, according to their sizes, bark and boughs included. The bark of these poles is sometimes sold to the country tanners, and sometimes exported to Ireland, where it finds a good market. The demand of the collieries is so great, that a greater profit, and by much a readier penny, is made by selling the wood in this state of growth, than can be expected from suffering it to grow up into timber: hence it is not likely, until the coal mines are exhausted, that West Wales, and especially Pembrokehire, will be able to raise for itself a competent supply of timber for building, and the purposes of husbandry.

As the soils of the *slate* and *coal tracts* bear a near affinity to each other in most points, so the woods naturally growing upon them are of the same species. In either of them, where the situation is favourable, nothing

thing more is wanted than fencing up rough declivities, waste corners, &c. and they will soon be crowded with *oak*, *ash*, and *alder*; one or other predominating, according to the prevailing property of the soil. The *oak*, however, is by far the most common; it agrees with most situations, excepting within the western stroke of sea winds, and upon limestone; but grows to the greatest size, and produces the thickest and most sappy bark upon strong and moist loams. The *ash*, according to vulgar opinion, affects wet and cold soils, whereas the contrary is proved by experience to be the fact. The finest and toughest ash timber grow upon warm grateful soils, provided they be not too dry. We have noticed oak and ash growing intermixed upon a cold clayey soil, somewhat elevated, and in a full western exposure: the oak trees thrived so vigorously, that the bark appeared with red longitudinal streaks, as if bursting; whilst the ash never attained half the common size before they all became decayed at their tops; and such are generally found of an inferior quality. Green moss covering the butts of ash, is a sign of health, and toughness of wood; and wheel-wrights select such, if possible, for implements in husbandry: white branchy moss, in clusters, extending to a considerable height, with the bark marked in all directions, is a sign of a reverse quality; especially if the trunk extends to a great length without diminishing much in its girth. The *alder* affects swamps or sloughs; though it be occasionally found upon gravelly soils, especially near brooks, where probably the seeds had been carried by floods, &c.

The less common natives of the *slate* and *coal tracts*, are birch, mountain-ash, bird cherry, &c. in the uplands; and *wych elm* (*ulmus montana*) asp or trem-

bling poplar, some sycamore, maple, linden or tei-tree, wild crab-tree, &c. in more sheltered situations.

The dry sandy soils of the coal tract, formed from, or resting upon, the siliceous strata of the coal field, produce beech wood, which is never found a native of the slate tract. On the open lands of Eglwys Ilan, Llanvabon, Celli Gaer, Merthyr Tudful, &c. the beech are never suffered to become timber trees by the sheep and cattle, for they are so fond of the leaves, buds, &c. of beech, that they nibble them into conical figures, as if nicely clipped with a garden-shears, in the old Queen Elizabeth's taste: but where preserved, as on the lowland gravelly soils, the alluvion of the coal tract in Kibwr, Miskin Vale, Llandaff, &c. beech trees grow to a gigantic size.

The red soil tract, which obtrudes between the slate tract and the middle limestone range, already described in the Chapter on *Soil and Surface*, also affords beech wood and timber, in addition to the various species of wood common to the slate tract. Several small tracts in Brecknockshire and Herefordshire, on this kind of red soil, are called *Ffawyddog** (beechy), from their abounding, or having abounded, in beech woods. In the sheltered and romantic valley of the Grwyney Vechan, near Llanbedr, are some beech trees four feet and a half in diameter. On Ty Mawr farm, in the parish of Llanstephan, Radnorshire, the property of W. Wilkins, Esq. M. P. is a beech tree 40 feet in length, and girting 12 feet four inches: three of its branches measure 34 solid feet; in all 414 feet. It grows in an

* An isolated part of Herefordshire, lying between Monmouthshire and Brecknockshire, is called *Ffawyddog*; and another hilly promontory south of the Usk, near Crickhowell, goes by the same name.

exposed situation, open to every wind, on a dry reddish soil about 18 inches deep, on a substratum of mouldering red rab, the general characteristics of the tract.

The neutral ground, if it can be so called, lying between the coal tract and the southern limestone tract, is productive of excellent timber trees, many of a large size, of most species common to other tracts. On this line of demarcation grew *Derwen Ccwn Mabli*, an oak far-famed as monarch of the forests of Siluria. The peasants of several tracts celebrate the majesty, and record the dimensions of some favourite king-tree which once flourished within their respective boundaries; such as *Brenhinbren y Ganllwyd* in Meirionyddshire, *Derwen Ccwn Mabli* in Glamorganshire, and *Derwen y North* in Brecknockshire: the latter grew between Savaddan lake and the river Usk, in the red soil tract; and was felled about the year 1799. Fourteen tons of it, of prime stuff, was carried down to the Hay, exclusive of remnants disposed of on the spot.

The southern limestone tract is less favourable to the spontaneous growth of woods, than the three tracts already described. Near the mansions of the greater proprietors, parks of timber, of fine growth and quality, are to be found; some of the ravines and slopes are beautifully wooded; but in general, the superior quality of the soil, the levelness of surface, and the proximity to the sea coast, combine to render the tract more advantageously favourable to tillage and grass, than to the rearing of woods and plantations. Beech, birch, alder, mountain-ash, &c. are never seen indigenous within this tract. The wych elm (*ulmus montana*), is not uncommon, and some of extraordinary size: at Cotterel Park-gate, on the side of the road from Cardiff to Cowbridge, is a wych elm, one of the largest in

the kingdom ; it is 20 feet in circumference at six feet high. Oaks are not numerous, excepting in particular spots. The upright, or English elm (*ulmus campestris*) is by far the most common in the Vale of Glamorgan, especially between Cowbridge and the sea ; and on many farms the only tree to be seen : it springs spontaneously in the hedges and copses, and attains an uncommon size. Some elms near Cowbridge are from six to seven feet in diameter. At Boverton we measured the " *Searjant's elm*," said to have been planted by Searjant Sayes, the proprietor of the estate, about 216 years ago : it girted thirteen feet two inches at the height of four feet. Elms at Gileston, the butt 13 feet in length, and so many in circumference. Here are also fine ash trees nine feet in circumference. Ash, moreover, are much less common in the vale than elm, which supplies its place for the various implements in husbandry ; for yokes, fellies, and naves in wheels ; for ploughs, waggons, and carts : this elm also supplies the place of oak for most of the purposes of building, roofing, flooring, &c. ; for keels and bottoms of ships, being, where always in water, very durable. It does not easily rive, and for that reason is useful in some of the larger machineries.

Mr. Clark, in his Radnorshire, p. 28, and Breconshire, pp. 25 and 43, is exceedingly severe upon tenants, for fraudulent depredations on timber trees, woods, and saplings ; and also upon landlords, for permitting them. An anonymous annotator in the margin of the Breconshire Report, is full as severe : he says, " there is no timber left in the country ; and the tenants lop and top what is left, and no care is taken of the young timber."

Mr. Clarke proposes an expedient, to render " the
county

county of Brecon one of the most beautiful and best wooded parts of the island : all that is requisite is, to let Nature have her own way, and refrain from doing mischief to the young plants. It would therefore be an easy matter to prevail on the farmer to be idle, when he was once assured of making money by his inactivity, by granting him the liberty of turning the wood to his own advantage, under certain restrictions ; and making him a partner with the landlord, in some proportion, in the advantage to be derived from the growth of such young saplings as might have originally risen on his lands during the continuance of his lease. Should the woodlands of the country be ever placed on any footing likely to protect them from those horrible and systematical depredations to which they have hitherto been subjected, it must be in consequence of the operation of some plan similar to that which has been just hinted at."

About eight years after these accusations were published, and these remedies were proposed, we might have expected to have found the woodlands of Radnor and Brecon in a lamentable state of neglect. We were, however, agreeably disappointed ; and found that an expedient for the protection of woodlands had already been adopted : not indeed that proposed above by Mr. Clark, but another, far more practical and more effectual. T. Price, Esq. of Builth, T. Gwynne, Esq. of Garth, and others, had detached the woodlands from the respective farms to which they had formerly belonged, and placed them under the care and protection of woodmen, to be fenced from the depredations of all animals, whether of the biped or quadruped kind ; and to be thinned and pruned as occasion required. In about nine years afterwards we found a striking alteration

teration in copse-wood, theretofore browsed by cattle, and cut by farmers and cottagers for fuel, then growing luxuriantly, adding beauty to the scenery, and fairly promising a future supply of navy and building timber.

The slopes and dingles in both counties, overhanging the valleys of the Wye, Elain, Eithon, Irvon, Edwy, Tame, Lug; Usk, Honddu, Bran, Esgair, Grwyney, &c. are either covered with woods, or capable of being rendered so by fencing and protection, and by planting where few or no roots exist. Copse-wood newly fenced up from damage should undergo the operation of the pruning tool: every stunted stick or damaged sapling should be cut clean at the root, in February or beginning of March; and the first year's shoots would be vigorous, lathy, and from three to seven feet in length, according to the soil and species of wood. Oak, elm, Spanish chesnut, hornbeam, &c. at Harpton-Court, walnut at Boltibrook, and ash at Old Radnor, afford specimens of the size those species of trees are capable of obtaining in Radnor below the forest. R. Price, Esq. M. P. has numerous and flourishing plantations of forest trees. James Watt, Esq. of Solio, has embellished the banks of the Wye, and the vicinity of Gladestry, with recent colonies of larches, firs, pines, elms, sycamores, and orchards.

In the hundred of Pains Castle we saw a plantation, of many years standing, in great need of weeding: the trees were so closely confined, that, like the unfortunate captives of Hyder Ally in the black-hole at Calcutta, they were literally dying for want of air.

W. Wilkins, Esq. M. P. has flourishing plantations at Maesllwch, planted about the year 1781: the larches are exceedingly tall and healthy.

The

The woods about Llangod Castle are extensive, consisting of varieties of forest trees, with several horn-beams.

At Trevecca we saw Scotch pines, planted by the late Howell Harries, of pious memory, in the year 1755 : some were near seven feet girth at the height of six feet, and were timber for from 50 to 60 feet in length. Of equal growth, but of greater age, are the Scotch pines about Penpont and Aber Camlas, on the Usk, above Brecon. Black and white poplars grow to an amazing size by the sides of brooks and rivers. In the Vale of Usk, there seems to have been some years ago a strange predilection for the Lombardy poplar, a tree of little use excepting for May-poles : they may indeed give a variety to that wildness of branching and foliage, which constitutes the beauty of our forest scenery

The woods of the *limestone tract of the Vale of Glamorgan*, consist of such as ornament the parks and groves near mansion-houses, recent plantations, and copse-wood in dingles, &c. *The mountainous valleys of the coal tract*, within any convenient distance of the great iron works, have been stripped of their grown timber; the places of which are now supplied with thriving saplings, and most of them well protected. At some distance from the iron works, in the parishes of Ystrad-dyfedwg, Llanwnno, Glyn Ogwr, Llangynwyd, &c. &c. there are woods still to be seen, in quality and tallness not surpassed in any part of the island.

“ Firs, pines, larches, &c. have been planted in large quantities on their estates, by many gentlemen ; more particularly the late Lord Talbot of Hensol, from whose plantations of about 50 years' growth many thousands of large fir trees, &c. have of late years been cut for sale. The large plantations of about the same period,

riod, by the late Sir Edmund Thomas, of Wenvoe Castle, are now grown up; and are capable of supplying the country with large quantities of useful timber. Those of Thomas Mansel Talbot, Esq. on his large estates of Margam, Gower, &c. are some of them upwards of 30 years standing, to the number of more than a million perhaps, and will soon furnish a considerable supply. The same may be said of the ample plantations of Sir John Morris of Clasemont; and many other gentlemen might be named, who are now extending their plantations largely."

"Larch has not been much planted in this county till of late years; but it promises in its cultivation to be more profitable than fir, pine, &c."

"In no part of the island are trees of all sorts seen of more prosperous growth, or larger in size, than in Glamorgan; but modern plantations are here formed of trees that are rather ornamental than useful."—*E. W.*

Mr. Fox, in the Original Report of this county, p. 47, noticed only the plantations at *Clasemont*; which unquestionably are both extensive and flourishing. Sir John Morris favoured Mr. Fox with particulars respecting his own planting, which we shall here presume to copy.

"Sir John Morris had been a planter since about the year 1770; and from that period to 1796 (when Mr. Fox wrote), he had planted above half a million, principally beech, oak, and ash; many sycamores, firs, larches, and birch; besides Spanish chestnuts, plane, elm, and poplars. He had raised nearly all his trees from the seed: when they were about three feet high, he planted them out about a yard distant: when the trees increased in size, so as nearly to touch each other, they were taken out to make further plantations;

tations ; so that every young wood was in fact a nursery. His fences were particularly strong, and were constantly attended to. The trees were annually examined, and such as were not thriving, were hoed around as you would turnips. Where the soil was particularly adhesive, a crop of potatoes was introduced, which produced an excellent effect. All stagnated water was carefully drained off. Various kinds of trees were planted in each acre of ground, by which was observed the sort that best suited the soil, exposure, &c. Open to the sea breezes, he found sycamore and elm particularly prosper. For 25 years his planting averaged 20,000 trees per year ; the number then became reduced to about 10,000 trees annually, which he proposed to continue as long as he had any ground on his estate most suitable to that purpose."

A few years back we had the pleasure of viewing the plantations at Clasemont, attended by the woodman : they were well protected, and still flourishing ; the elm and larch appeared to be the hardiest.

On the same line of coal tract as the plantations of Clasemont, stand the fine and extensive woods of Margam, the property of the Talbot family of Penrice Castle. Every traveller, in passing from Pyle Inn towards Briton-ferry, must be struck with the magnificent and exalted appearance of "*Cryke Wood*," which in grandeur is supposed to stand unrivalled. It covers the breast of a mountain 800 feet in height, more than a mile in circumference, and fully exposed to sea winds from the south-west ; which has given its surface a shorn appearance, as uniformly level as that of a newly mown meadow. The trees, however, when we enter the interior, are found to be lengthy and bulky ; and the oak timber, by a late estimate, made out of curiosity,

was

was valued at 60,000*l.* though it forms but a part of the timber property of the Talbots in this parish, which contains upwards of 11,000 acres.

Under "Cryke Wood," on the flat, between the orangery and the mail-road, is a tract of ten acres, crowded with the most majestic forest trees: and it seems to have been originally a neglected nursery, as the several species of trees are together, in direct lines, just as they were transplanted from the seedling beds. A million of young ash trees, produced from fallen seed, might be transplanted from hence: under such a canopy of shade they are very weak in proportion to their length; they should, therefore, when transplanted, be cut just above the roots, so as to produce stronger stems. No other species of trees, growing from seed, are found here so patient of smothering shade as the ash.

Between seven and nine in the morning, on the 10th of November, 1810, a violent hurricane from the north-east blew down 45 oak trees in one part, and 36 oak trees in another part of these woods. "The king and queen of the forest" were in the hurricane's course: the king was taken *, and the queen still remains a widow. Oaks suffered more than other trees, their roots being more horizontal, or less able to strike tap roots into the substratum of pebbly gravel. Sycamores, being firmer rooted, and less tough, were broken in the middle, though of a full growth. It is remarkable, that the oak trees in this grove, have their fibres or grain generally spiral or twisted, which lessens their value for many purposes.

In October 1811, we had a view of the hurricane's

* The trunk of the king-tree, 55 feet in length, girted 7 feet 4 inches in the middle.

devastation in these woods. It had made an opening of 40 or 50 yards in width in a straight line through the forest; the trees of course were laid regularly in the same direction. The storm lasted with unabated fury for about two hours, and then turned almost instantaneously to the reverse point, as if to restore the equilibrium, or to fill up the vacuum it had occasioned in the north-east. Three causes may be assigned for the unrooting of the trees in this particular spot: 1. their extreme length; 2. their loco-position at the angle of incidence under Margam hills; 3. the soil wherein they grew not being cohesive, and upon a substratum of gravel, which the roots had not penetrated.

The trees of this grove of ten acres, of whatever species, are exceedingly tall: they are all anakins. An ash however is observable at a distance, as soaring above all the rest: its height, taken by a quadrant, and by the projection of its shade, was 130 feet*. Near the ash is a bay tree, "or rather a bay bush, derived from one root, but sprouting from the ground in various branches, measuring 56 feet in height†, and 45 feet in diameter of foliage, and still vigorously growing."

Caermarthenshire, says Mr. Hassall (p. 30), "from being a well wooded county, is now become the reverse; and the stock of timber is diminishing so rapidly, that a very few years will probably reduce the inhabitants to great straits for a supply of this necessary article. The vast quantities of timber which every part of the county produced till of late years, seem to have begot

* This is equal in height to the cedar tree in the Isle of Cyprus, mentioned by Pliny.

† "I have seen bay trees near 30 feet high, and almost two feet in diameter."—*Evelyn, in Sylva.*

in the proprietors, an indifference as to the protection of their woods, from which too many of them have not yet recovered. But surely the approaching scarcity is a circumstance sufficiently important to awaken the most torpid to a proper sense of their future interests; and it is most sincerely to be wished, that every proprietor of woodlands in this county, would follow the few examples to be met with at present, of fencing their coppices, and promoting their future growth by every possible means.

“The inequalities of the surface of this county, render it in a peculiar manner adapted to the growth of timber. In a country thus favourable to the growth of so ornamental, so useful, and so necessary an article, is it not to be regretted that its cultivation should be neglected? and every one interested in the future prosperity of this valuable county, must perceive the advantages of using all possible endeavours to keep up the stock of timber.

“I do not find that there are any nurseries for raising forest trees for sale, in sufficient quantities to supply a great demand: perhaps an undertaking of this sort, under the encouragement of the gentlemen of the country, might be productive of the happiest effects, by giving opportunities to proprietors, who wish to improve their estates by planting, to supply themselves with forest plants at an easy expense.

“Some seedlings are purchased in boxes, from the London and other nurseries; but the high price of the land and labour in those parts, occasions the plants to be so crowded in the nurseries, that when they come to be set out in more exposed situations, they do not often thrive to the satisfaction of the planter.”

Twenty years have now elapsed since this alarm-bell
was

was so spiritedly and patriotically rung by Mr. Hassall. It must be owned that he deserved well of his country for so doing; and we doubt not that it had a considerable good effect. Caermarthenshire is unquestionably one of the most appropriate counties for the profitable raising of forest timber, of any in South Wales; its surface undulating; its declivities of a gradual slope; its soils and climature favourable; and in point of situation, it is not so exposed to the western blasts of the Atlantic as the greater part of the neighbouring counties of Pembroke and Cardigan. These natural advantages, in times past, clothed considerable portions of it with majestic forest trees; which, as he observed, were cleared off from many estates, without any precautions being adopted for the securing of future supplies. These observations were at that time equally applicable, in a greater or lesser degree, to every other county. The neglect of protecting copse-wood, and planting, seemed to be so generally epidemic, that very few proprietors may be said to have escaped, until within these few years. However, most of the greater landed proprietors, and many even of the yeomanry, are now gradually improving their respective properties, by fencing and preserving copse-wood, chiefly consisting of oak, the natural child of the soil, and planting in well selected spots varieties of forest trees, the hardiest and best adapted to the situations.

The greatest number of forest trees planted in one year, on the same property, that we have heard of in South Wales, excepting the plantations by Mr. Johnes, at Hafod in Cardiganshire, was on Llaangennech-Park estate, in this county, when under the management of Mr. Vancouver: in the year 1804 he was said to have planted 460,000 forest trees.

Leases, in some instances, we found to be *Obstacles to Improvements* of this kind; of which we can mention instances, on the northern side of the range of hills which separate the Vales of the Towy and the Teivy. Where such old leases exist, without a reservation of woods to the landlord, the tenant's claim to the boscase and pasturage of copse-land, should be bought in by the landlord for the remainder of the term; and tenants must see whether such compromises would nullify their leases.

The Rev. Rees Prichard, A.M., the pious and celebrated Vicar of Llandovery, in this county, about the year 1644, among other charitable donations in his will, made a most singular bequest, of about 150 acres of oak copse-wood, to be cut as occasion required, by the poor of that town and its liberty, for their own use as fuel. Perhaps it may not appear strange, that several of the charitable Vicar's bequests were afterwards litigated by his less charitable descendants, and others. This copse-wood became claimed by a Mr. Sylvanus Lloyd, of rapacious memory, though without success. No other poor, than those of the town and township of Llandovery, are permitted to cut the wood; and those few, though they are to carry none off excepting on their shoulders, &c., contrive to keep the 150 acres continually in brushwood. Were some scheme contrived to mortgage the wood, so as to afford the poor claimants annual pittances in lieu of brushwood, and to get the wood well fenced and protected from all trespass, until the oaks grew even to the size of pitwood for the collieries, railing, and roofing for outbuildings, the periodical produce of wood and bark, well laid out at interest under the direction of trustees, would well maintain the poor claimants from being burdensome to the parish,

parish, the poor-rates of which, in 1803, amounted to 122*l.* at 6*s.* in the pound.

Though this county may have justly been branded with neglect, in encouraging the growth of woods, yet we have an instance recorded, of acorns being sown in a piece of several acres about 70 years ago; a period perhaps the most lethargic in the annals of Dendro-culture. Two boys, during Easter Monday recreations, kindled a fire in a wood upon the demesne of Glan Brân: the weather being dry, and the eastern wind strong, a conflagration took place, which reduced the whole wood to charcoal. The grandfather of the present proprietor, Sackville Gwynne, Esq. got the coppice ridded of roots, ploughed, and sown with acorns, from which the present crop of oaks have sprung.

Mr. Hassall, as above quoted, complains of the want of nurseries for raising forest trees for sale, in sufficient quantities to supply a great demand. In this instance also, the county of Caermarthen is improving. Cottagers, who at first tried by way of experiment, to raise a few plants from the cones of firs, and pines, from acorns, or other mast, to shelter their own dwellings, have by degrees been encouraged to extend their nurseries, and accommodate the public with plants. We must be here understood as speaking of the district in general. The Cardiganshire Agricultural Society, among other premiums to be noticed in the proper Section, has for years back offered and granted premiums, *"to the persons who shall have for sale at the time of giving in their claims, the greatest numbers (first and second) of transplanted forest trees, in rows about one foot by six inches from plant to plant."*

This encouragement has raised six nurserymen in

different parts of the county, some of them occupying nurseries from five to ten acres.

The professed nurseryman upon the largest scale in the district, that we know of, is Mr. Hindes, whose plants of forest trees, fruit trees, and shrubs, fill a space of about 18 acres, at Velindre, near New-castle in Caermarthenshire; but also conveniently situated for the counties of Cardigan and Pembroke. Only a quick fence divides this nursery from another of about 8 acres, belonging to James Evans.

Mr. Hindes has been somewhat unfortunate in the spot of land where he has fixed his nursery; and the more so, as it is in a part of the country where good soil abounds. The soil of this nursery, for the greater part, is a poor clay with some peat earth, which must have cost him from 3*l.* to 4*l.* per acre, to improve by draining, &c. Such soil is easier kept clean than a richer one; and the vulgar opinion is, that the plants reared in such soils, are hardier, and will thrive better when transplanted to a better soil. This opinion is opposed by Boucher, an Edinburgh nurseryman, who published a *Treatise on Forest Trees*, in the year 1775. In the preface, he says—"It is a received but mistaken opinion, that trees ought to be raised in the nursery on a poorer soil, than that to which they are afterwards to be transported for good. This is a specious doctrine, and seemingly consistent with nature; but experience disproves it. The future growth and stateliness of trees depend much on having a vigorous setting off in their infancy. In a hungry soil, they contract diseases they never get rid of. But by good soil, here is to be understood, that which is naturally so, and not one too recently pampered with dung; the manure must

must be first mellowed, and reduced to homogeneous earth."

Mr. Hindes's average sale of forest trees, is about 400,000 a year *. He is able to undersell the smaller nurserymen; and gentlemen who formerly reared their own plants from seed, or procured seedling plants from Scotland, &c. now find it more convenient, and advantageous, to purchase transplanted trees by the thousand. Mr. Hindes sells at various prices, from 20s. to 50s. per thousand, according to sizes, species, demand of the season, &c. Upon a large scale he sells very cheap. In June 1813, we viewed extensive tracts planted by him, on one property on the slopes of the Vale of Teivy, during the springs of 1811, 1812, and 1813. The whole number amounted to 395,000 two-year, and three-year old larch, firs, pines, oak, ash, elm, and beech; which at 1*l*. per thousand for the trees, 4*s*. per ditto for 15 miles carriage, and 12*s*. per ditto for planting, insuring the growth of 17 in every 20, amounted only to 711*l*. Upon a small scale the prices must be higher.

On our visit to Mr. Hindes, we were favoured with the following inventory of his stock in trade, for the service of his customers the approaching season, viz.

During the last season, Mr. Hindes's sale of forest trees, was	576,365
Ditto of apple, plum, and cherry trees,	1506
Flowering shrubs,	725
	<hr/>
	578,596

Mr. Charles Price of Llechryd, had also last year 130,000 transplanted forest trees for sale, for which he received the first premium of the Cardiganshire Agricultural Society; and Benjamin Williams, of Pengwern, had the second premium, for 30,000.

Oak seedlings,	500,000
Ditto 2, and 3 years, transplanted,	90,000
Ash seedlings, 2 year old,	200,000
Ditto transplanted, 1½ to 4 feet,	160,000
Beech, transplanted, 1 to 4 feet,	50,000
Birch of different ages,	10,000
Horse chesnuts, transplanted,	5000
Spanish ditto, ditto, 2 to 4 feet,	3000
Wych elms, ditto, ditto,	13,000
English ditto, transplanted, 4 to 7 feet,	5000
Sycamore,	20,000
Mountain ash,	20,000
Plane trees, 6 to 9 feet,	200
Lime trees, 4 to 5 feet,	500
Black poplars,	3000
Silver and balm of gilead firs,	5000
Spruce firs, of sorts and sizes,	50,000
Scotch pines, 1 to 3 years transplanted,	500,000
Weymouth pines and pineasters,	3000
Larch seedlings,	300,000
Ditto, 2 years transplanted,	200,000
	<hr/>
	2,137,700
White thorns, and crab stocks for grafting, }	500,000
from 1 to 4 year old,	
Apple trees, of choice sorts,	3000
	<hr/>
Total,	2,640,700

The Lord of Kemaes, in his MS. History of *Pembrokeshire*, in the reign of Elizabeth, published in the *Cambrian Register*, saith, "This countrey groneth with the general complainte of other countreys, of the decreasing

decreasing of *wood*, for I finde, by matters of recorde, that divers greate corne fields were in tymes past greate forests and woods. The best standing woods at this present in Pembrokeshire, wherewith the countrie is servid for buildings and other necessities, are these that followe : 1. Narberth Forest; 2. Kilgarran; 3. Coedtraeth; 4. Caneston; 5. Mynwer; 6. Penkelly; 7. Kilreth; 8. Hookewood; 9. Upton."

1. *Narberth Forest*, including Caneston, and Newton Cliff, by a survey taken in the reign of James I. and quoted by Mr. Fenton, in his late History of Pembrokeshire from the Slebeach MS., contained 873 acres of woodland, of the following description and value : 3071 navy timber trees, at 1*l.* each, 3071*l.*; 11020 fire-wood trees, at 10*s.* 5510*l.*; 21,000 oak saplings, not valued.

By the above valuation, we may guess the dimensions of the navy timber to have been extraordinary; for even in the year 1770, or thereabouts, the writer of this article remembers coppices of the largest and finest forest oak in Montgomeryshire, sold standing for 1*l.* a tree; the bark then selling for about 40*s.* per ton.

At the time of the above valuation, Narberth Forest was stocked with red deer: now, both the deer and the wood, excepting small copses, have disappeared, and are succeeded by enclosure and cultivation.

6. *Penkelly Wood*, is thus described by its owner, in the reign of Elizabeth: "The Lord of Kemaes hath a wood in the manor of Eglwys Wrw, called Penkelly, containing, of the usual measure of that country, about 500 acres* of wood, enclosed with quickset and pale,

* Five hundred of the customary measure called *crw*, make nearly 1038 statute acres.

in compass about 900 perches of eight yards. It is all growne with greate oaks, of 200 years old and more, some younge wood of 60 years growthe: and most part of it well growne with underwood, as orle, hazel, thorn, and willow; the herbage whereof will sommer 30 breeding mares, and winter 300 sheep, and 200 cattle, well and sufficiently, besides swine, which may be kept there. Alsoe there is in said wood 30 cock shots, wherein is greate store of woodcocks taken yearly, which cock shots are the lord's owne, to do with them what he pleases. He has also paunage and wild honey. There alsoe breedeth in said woods sparhawkes, which are the lord's owne."

Besides the foregoing *nine* "best standing woods," the same author enumerates *twenty-seven* woods "of dyvers gentlemen, sufficient to serve their houses of fuell, and some for byldinge;" together with seven other "woodes and forestes in tymes past, now destroyed and made arable landes."

Among the eight wants of Pembrokeshire, enumerated by the same author, the second, "that pincheth this countrey, is *scarcitie of tymbre and woode*; for the soil being naturally unapt for wood, there are but few places stored therewith; and that not in generall as in the woodland countreys is to be scene; where every man hath somewhat, were it but his hedge-rows: but where woode is in this countrey, it groweth together in one forest; which is of late yeares, by ill management, much impaired; and almost in men's memorie now lyvinge, utterlie decayed."

Annotation on the above, by John Lewis, Esq. of Maenornawan, in the reign of Queen Anne:

"If there was such cause to complain of the decreasing state of timber in this county in Queen Elizabeth's time,

time, how is that cause increased in the course of another century! for in my memory, most of the great mansion houses have been stript of their shelter, a principal object with our ancestors, when they made choice of their place of residence."

Such being the complaint of gentlemen, natives of Pembrokeshire, a century or two ago; it is no wonder that Mr. Hassall, in the year 1793, should thus express himself: "The stock of timber is so reduced in the county, that there is too much reason to apprehend a few years more will bring the farmer to the sad necessity of importing wood for the ordinary purposes of husbandry."

On the Píoton Castle and Lawrenny estates, there are considerable quantities of timber trees yet remaining; which, with a few surviving groves about Slebeach, form the bulk of the present stock of timber in that part of the county, termed "below the mountains: north of the Perselly range of hills, the numerous groves of Dyffryn Gwain, part of the Orlandon and other estates; Penkelly woods, part of the Bronwydd estate; and the woods of Colonel Colby of Ffynhonau, are the most extensive. It is no wonder that the Valley of Cuch has upwards of a thousand years ago been selected as the scene of Romance; it is still enchanting, and rendered more so by Colonel Colby's woods and plantations.

The interior of the county, upon, and in the vicinity of, the coal tract, is better adapted than either the limestone tract to the south, or the slate tract to the north, for the rearing of woods. Here, upon one property, are 1500 acres of woodland, mostly oak. Their situation, however, seems to have been too convenient for the collieries; which induced Mr. Hassall to hope,
"that

“that the present proprietor of the most extensive woodlands in the county, would not be inattentive to their future growth, and to planting; and thereby repair, in some measure, the mutilations they have lately suffered.”

“The usual course of management in these woods, was to thin the young shoots at the growth of three or four years; this was called *waste weeding*, and generally consisted of pruning away all the inferior shoots thrown out by the stumps, or stools of the trees that had been felled; leaving the most vigorous shoots, to the number of four, five, or six upon a stool, to grow for a succeeding crop. In about five years more, another weeding took place; and this was called a *cord-wood weeding*; cuttings being come to a size fit for making charcoal. The wood thus thinned was left to grow for a coppice of *poles*; and in about 15 years more, the poles would be fit to cut for the use of the neighbouring collieries.” By this, a crop of poles for the coal works will require from 23 to 25 years from fall to fall.

“The price given for pitwood being so great, induces the proprietors of copse-wood to destroy them: so that in a few years, without a general and improved system adopted, no wood can be procured.”—*Rev. Mr. Evans.*

“The growth of wood is for the most part slow; the oak is, however, remarkably full of heart.”—*Mr. Hassall.*

“The *Welsh oak*, on account of its lower growth, is preferable to the English; a circumstance not generally known, but which is easily demonstrable from a superior specific weight.”—*Mr. Clark, in Breconshire.*

We are not aware, that there is any specific distinction

tion between Welsh and English oak; difference in specific gravity must depend entirely upon the variety of oak, and the soil it grows upon, whether its situation be east or west of Offa's dyke. Botanists pretend to distinguish seventeen or more varieties of oak: Welsh peasants, who know nothing of the *Monoclea*, or any other botanic class, distinguish only two kinds of oak; the *female*, or that which sheds its leaves in autumn; and the *male*, much fewer in number than the former, which retains its leaves, especially on the lower branches, till spring, like the beech: the latter is commonly coarser grained, darker in colour of wood, less easily rived or cleaved than the former; and consequently better adapted for wheel-naves, where elms are scarce.

Where soil and situation combine to render the growth of oak slow, the *heart* is greater in proportion to the *sap*, than in quick-growing oak trees upon good soils, and *vice versa*. This rule holds good in England as well as Wales.

Mr. Lloyd, in the Original Report of *Cardiganshire*, writes more concisely, though not at all more favourable than his contemporaries in the other counties. In p. 16, Mr. Lloyd says, "the county has but little wood, and that little is daily lessening; and what is left is much neglected." We must, in justice to the county and its land owners, offer something in palliation of this laconic and severe report.

There are but few parts of the district more favourably circumstanced for the growth of wood, than the greater portion of this county: Nature seems to have formed its undulating surface and numerous ravines for woods and plantations. However, the general character of the county, it must be confessed, is its being too
destitute

destitute of wood; but several parts of it exhibit luxuriant exceptions to the general nudity. Rural sceneries may be grand and sublime, but they are never beautiful without woods: in this respect, the Valley of Teivy, from Llangocdmor, up by Llechryd, Newcastle, Dol Haidd, Llys Newydd, and Landyssul, is not inferior to the most celebrated sylvan scenes of South Wales. The views about Kenarth-bridge have few equals, both in variety and perfection.

After a tedious stroll through the dreary interior, we were much gratified in seeing the extensive woods of W. O. Brigstocke, Esq. of Blaenpant, especially those on the Gelli Dywyll estate, which consists of a soil more appropriate to the growth of large timber than to any other purpose of agriculture. Mr. Brigstocke has for years back used the most prudent economy in the management of his woods, by constantly employing woodmen, who put in their employer's pocket several hundred pounds a-year, from the pole weedings, faggots, bark, &c.; which however is of much less consideration than the obvious improvement of the preserved saplings. May his woodmen be active, for they have much yet to do; and when the first weeding shall be completed, the second may be commenced, which must turn out still more profitable.

The Valley of Aeron has also its slopes finely interspersed with woods, chiefly oak, as in most places on the slate tract. In the year 1792, a copse-wood tract of 29 acres, on a southern declivity in this valley, was bought by a gentleman for 400*l*. The whole was fenced, and protected from injury. The weedings in bark and wood for fencing, paid periodically the interest of the purchase money, or nearly so. In 1792, the saplings, mostly oak with some ash, were from one
to

to ten years' growth. In 1809, a lot was sold for 750*l.*; in 1813 another sold for 575*l.*; and there still remains what is valued at 500*l.*: in all 1622*l.* from a spot of sideland purchased in 1792 for 400*l.*

From another property on the slopes of this valley, the rental of which, a few years back, did not exceed 300*l.* timber have been sold within the few last years to the amount of 9000*l.*

These small instances, are sufficient to shew the propriety and consequent profit of protecting woodland.

There is scarcely a rivulet in this county which is not engulfed in a deep ravine, clothed with the summer verdure of the oak; either protected and thriving, or neglected and doomed to remain in brushwood. Those who visit the fall of the Monach at the Devil's-bridge from Aberystwyth, can witness the dryadic retinue of the Rheidiol. The Ystwyth, within a few miles of its source, is gaudily decorated by the well grown woods and plantations of Hafod, which cover from twelve to fourteen hundred acres. The brook Cell, falling into the Ystwyth below Hafod, divides the woodland properties of Hafod and Crosswood. The copse-woods of the latter property are extensive; and were formerly, like most others, much neglected; but now, and for years back, the present manager, the Hon. Colonel Vaughan, M. P. among other improvements, protects the growing woods.

In the north of the county, the woods on the Gogerddan estate are extensive; some of them, on the demesne, and Lodge Park, are well grown and thriving. At Lodge Park, the oak are among the finest in the county, fit for prime navy pieces, &c. About two-thirds or more of the beech coppice ought to be cut,
that

that the remaining trees may have space to grow into bulky timber. The proprietor, Pryse Pryse, Esq. we were informed, employs a woodman with 50*l.* a-year salary; whose main office hitherto has been fencing and protecting. Weeding or thinning seems absolutely necessary. Several years back, firs and pines have been planted in several places among copse-woods of oak; the foreigners have overgrown the natives, and should be cut down, excepting in a few places, where ornament is the chief object; otherwise the oak can never prosper. Near Lodge Park the woodman seems to have begun upon his weeding system, during the spring of the present year. With all deference to higher opinions, we think he ought to have cut down the whole in that quarter, to ensure a quicker and a kindlier growth of oak trees; as those left to remain appear to have been equally damaged and stunted in their growth, for want of protection in their infancy. Thick woods on shallow soils, especially upon the blue slate rock, commonly become too mossy to grow thrivingly. Woodmen might use hooks, such as draw moss for slaters and dry wall masons, to clear the moss about the roots of trees: women and children might perform this office expeditiously by the acre. The owner of the Gogerddan woods might put some hundreds of pounds a-year in his pocket, by weeding his woodlands; and thereby incalculably improve his property.

We must here beg leave to enter our protest against the unseasonable pruning, or lopping off the branches, of well grown pines, &c. Near Tal-Bont, and adjoining the Gallt y Crug lead-mines, are extensive copses of oak belonging to Mr. Pryse, and intermixed with

rows

rows of Scotch pines* of from twelve to twenty years' growth. The woodman, finding the pines oppressing, and even smothering the oak, instead of cutting them all down for railing and building stuff, &c. lopped off the lateral branches, as we were informed, in March last. This unseasonable lopping, at the time that the resinous juice was in circulation, brought on a gangrene in every tree so amputated; and though well sheltered from the strong winds, many of them had been snapped off short, in the gangrened part, during the months of May and June last. There was not a pine left without amputation, otherwise it might have assisted in discovering the cause of the gangrene, a kind of disease we never noticed elsewhere. If our information be correct, that the amputation took place in March, or late in Spring, we cannot attribute the disease to any other cause than a derangement in the circulation.

On lopping of Trees.—"All kinds of firs are injured by lopping the old wood; and therefore ought to be pruned when the branches are young and tender. The best season of pruning them is as early in autumn as the sap is at rest."—*Boutcher on Forest Trees*, p. 61.

"Scotch pines are too commonly lopped: this may cause them to run up to a great height, so as to make excellent May-pole timber; but they will never increase sufficiently in bulk to be of any great use in building, &c. Timber trees should always be left to nature, to branch out as they please: beauty of growth, as well as utility, requires this. Poplars are

* Commonly called Scotch firs: we have followed Boutcher, in his distinction between *firs* and *pinus*.

WOODS.

much injured by the pruning of their side branches : lateral expansion or increase of bulk is impeded by, and they will only form tall and slender poles. Trees having lost their leaders, will always overtop in bulk the trees that have not ; hence the apparent utility of pruning the leaders. Beheaded ash at a certain age, are said to make tougher implements of husbandry, axles, &c. than others that have undergone that shameful operation ; which we by no means recommend, let the change occasioned thereby, in the constitution of the tree, be what it may."—*E. W.*

Plantations.

Though the county of Cardigan has commonly seemed rather woodless ; yet, from the foregoing sketch, we trust that a more favourable opinion of its powers of producing vast quantities of timber in

in a succession of ensuing autumns."—*Mr. Malkin*, in 1807.

Amount of the Plantations at Hafod, from October 1796, to April, 1813.

From October 1796, to April 1797,	{	Larch,	400,000
		Elm, beech, ash,	200,000
		birch, &c.	
		Alder,	50,000
From October 1797, to April 1798,	{	Oak,	10,000
		Ash,	25,000
		Larch,	400,000
From October 1799, to April 1801,	{	Larch,	400,000
		Various forest trees,	580,000

The account of trees planted from October 1801, to April 1806, being five years, was consumed, among other more valuable materials, by the ever-to-be-lamented catastrophe which happened at Hafod, in February 1807. As Mr. Johnes had not ceased one year from his labours, we think ourselves far within bounds, when we estimate the five years planting at } 800,000

—especially when we refer to the transactions of the County Agricultural Society, where it appears that Mr. Johnes was honoured with a premium, for having planted 400,000 forest trees during the season of 1803-4.

Carry over, 2,865,000

Brought forward, 2,865,000

The account preserved from October 1806,
is as follows :

From October 1806, to April 1807—On	}	100,000
posite the New Farm, on the side of the Aberystwyth road, mostly larch, 25 acres,		
From October 1807, to April 1808. On	}	140,000
Bwlch yr Oerva, adjoining the above, 35 acres,		
From October 1808, to April 1810—On	}	380,000
Bod-Heol, adjoining the above, 95 acres,		
From October 1810, to April 1811—On	}	184,000
Ty'n y Bryn, and Pwll Piran-hills, 46 acres,		
From October 1811, to April 1812—Above	}	144,000
the New Farm, and on Ty'n Bryn lower hill, 36 acres,		
From October 1812, to April 1813,	Larch,	150,000
	Spruce firs,	5000
	Beech,	3500
	Alder,	5000
	Black poplar,	1000
		<hr/> 3,977,500 <hr/>

Upon the whole, we may fairly estimate Mr. Johnes's plantations from October 1796, to April 1813, at upwards of four millions ; being an average of about 240,000 a year for 17 years successively ; exclusive of 55 acres planted with acorns in the season 1797-8.

There are many other spirited planters in the county, and among them W. Lewis, Esq. of Llannerch Aeron; J. N. Williams, Esq. of Castle Hill; J. Lloyd, Esq.

1813

of

of Mabus; the Rev. A. T. J. Gwynne, of Tyglyn; Ll. Parry, Esq. of Gernos, and others, who have recently planted from 40 to 60, and 100,000 each; besides a great number who have planted from 20 to 50,000 each. The smaller yeomanry also follow in the rear; and even tenants aspire to the premiums of the Society, for planting on their landlord's property.

Hart Davis, Esq. M. P. for Bristol, having lately purchased the Peterwell and Millfield estates, in the Valley of Teivy, among other improvements thereon, planted in 1811,

Oak, ash, larch, Scotch pine, beech, elm,	70,000
Ditto, ditto, ditto, in 1812,	140,000
Ditto, ditto, ditto, in 1813,	185,000

From Mr. Hindes' nursery, in three years,	395,000
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During the same period, Mr. Davis has also enclosed open copse-woods of oak, on the south of the Teivy 90 acres, on the north of the Teivy, 100 acres: all fenced with a foss and mound, planted on the top with quicks, which are "frithed" or guarded on the outside by a hedge of wattled trowse.

In the plantations, the oaks are set at proper distances among pines and larches; the latter to encourage the growth of the oak until they become an incumbrance: they are then to be felled, that the oak may grow more freely by the extension of their branches.

A woodman in the Valley of Neath, observed that "birch, or some other upright growing underwood, should always be planted with oak, and left uncut with it, to train it up clean and straight, as well as to shelter it; and that cutting the underwood periodically for cord-wood, checks and stunts the young oak; renders it hidebound and mossy, by exposing it to colds,

from which it has hitherto been sheltered ; and oak does not well bear cold winds."

Upon a retrospect of what we have here stated respecting woods and plantations ; when to about a million of forest-trees annually planted from Mr. Hindes' and other home nurseries, we add about the same number from the nurseries of Messrs. Sweet, Miller, and Sweet, of Bristol ; and again, an equal, if not a greater number from Scotland, London, and Liverpool, &c. ; we cannot estimate the yearly planting within the six counties, at less than three millions : when to these we add the thousands of acres of oak copse-woods, formerly neglected, but now fenced up and well managed, a future prospect of plenty of timber, wood, and bark, opens before us, instead of the years in which we did, and for a long period to come in which we shall, suffer scarcity.

Proprietors of woodlands, with respect to their management of them, may be divided into three classes :

1. Those who leave their woods to chance : their coppices, when a fall takes place, are not fenced up for a succession : with these, the age, or quickness of growth of trees, are no objects ; consequently they injure both themselves and the public. The number of this class is gradually diminishing, by desertion to the next class.

2. Those who use prudence and economy in their woods : when the woods are full grown, to avoid loss, they are converted into ready money ; more are planted, and the whole is protected from injury. If they fall trees half or quarter grown, they may be accused of imprudence ; but frequently without reason ; especially in coppices of such trees as sprout again from the stools ; for by so doing they ensure a quicker return of profit ;

profit; and supply, in some measure, the present immediate demand for such wood, and bark for tanners. This class observes a due medium between the two extremes; and is gradually increasing in number.

3 Those who preserve their woods, of whatever age, with what may be termed druidical fastidiousness. The stroke of the axe upon a hollow trunk, is to them a most mournful sound. These, however, are very few in number. We were informed of one, who, to get rid of the importunity of his miller, who could not grind well for want of a new wheel-shaft, traversed his extensive woods repeatedly himself, for he could not trust any one else, in search of a shaft, but without success: "he could not find a blade of grass in a bundle of hay." He therefore gave orders to his miller to buy a shaft, and he would allow him the price in the next payment of rent. This Droid became subject to the metempsychosis, and his heir soon found no difficulty in finding plenty of wheel-shafts and navy pieces."

The nobility and gentry, who have parks surrounding or adjacent to their castellated mansions, ought to be exempted from being numbered in the latter class; for it would be subversive of a reigning taste, to deprive such residences of their antiquated accompaniments, the venerable and majestic oak: but still, this ideal taste dooms hundreds of thousands of pounds to remain dormant in a kind of "sunken fund," from whence neither principal nor interest will ever be recovered. Prudence suggests, that other trees, of quick growth, and when near maturity, are full as majestic in appearance as the most stately oak; such as the two elms, the wych and the English, should be planted and protected here and there, in the more open parts

of a park. In a few years, comparatively, they would begin to rival the oak ; the major part of which might then be felled, to supply, in some measure, with wood and bark, the demand of that dreaded hiatus which must arrive, before the very numerous recent plantations and newly protected copse-wood will become timber. Among quick growing trees, few are so likely to rival the oak in majesty as the elm ; and dabblers in taste, without minute inspection, might not perceive the difference.

Plantations in Western Exposures to the Sea ; with some Observations on the hardier kinds of Trees, &c.

Lord Cawdor, from the year 1795 forward, planted on Stackpole Court demesne, about 30,000 trees ; consisting mostly of larch, oak, Spanish chesnuts, beech, and English elm. The exposure is not the most unfavourable ; they consequently flourish. The larch and beech, were found to be the hardiest.

Mr. Mirehouse began to plant at Brownslade about the year 1784, in a situation fully exposed to the Atlantic, and within a mile of its shore. The trees for some years did not thrive. Stone walls with indented outlines, mounds of earth with wicker-work on their summits, &c. were made, to break the force of the winds. Such fostering shelter gave the trees a set-off, which they have ever since improved ; and are now very interesting examples of what judicious exertions may accomplish. Mr. Mirehouse's plan was to plant in the thickest array that could possibly be done : which has been succeeded by a gradual weeding, as the trees were found to interfere with each other's growth. The western sides, moreover, are clipped by
the

the winds, to an angle similar to that of the roof of a building. Mr. Mirehouse's success has inspired many with hopes and endeavours to succeed, by planting near the sea in exposed situations. Here, the two elms, the Dutch and English, and the plane-tree, are found to be the three hardiest on the outsides of plantations.

Mr. Hassall of Kil Rhiwau, has belts of plantations on his farm, very appropriately called "Windy Hill," in a full western exposure, and within a few miles of the sea. On the west side the Scotch pines have lost most of their verdure: the larch stands its ground much better; it even flourishes and looks healthy: on the eastern sides of the belts, the Scotch pines flourish as well as the larch. In such exposures, belts should be formed wide, that allowances may be afforded for failures on the windward sides.

Still nearer the sea, but not so fully exposed, we observed a plantation of Mr. Richard Jones's at Pant Tirion, near the mouth of the Teivy. The Scotch pines in the western van, had surrendered every vestige of vegetation, and some of them even every symptom of life, to the storms of the ocean; though their fellows in the southern and eastern ranks appeared healthy. The larch, sycamore, and beech, stood their ground in the western lines, where the Scotch pines had failed.

In the plantations about Wervil Brook, by the late Rev. D. Turnor, the Scotch pines in the western rows are of a tawny complexion; whilst other trees, equally exposed, maintain their verdure.

The opinions of different persons nearly coincide, as to the superior hardiness of seven or eight different species of trees; though they somewhat disagree in

the arrangement of them, or in the order of precedence: one giving the first place to sycamore, a second to elm, a third to larch, &c. From attentive observations on the western coasts, we are inclined to consider the eight following species as the hardiest, or least affected by sea winds; viz. sycamore, birch, mountain-ash, larch, ash, elm, beech, and plane. Screened by belts of the hardier kinds from the west, the tenderer sorts, Scotch pines, spruce firs, and even oak, would flourish.

Among fence shrubs, we give the precedence for hardiness, to the brown or Welsh willow, the black or brown-black bullace tree (*prunus insitilia*), and next elder. In a fence composed of these three plants, of a north and south direction, on which the effect of the western wind is most visible, the points of the elder were stripped not only of leaves, but also of the bark, whilst the willow and the bullace were very little affected. The great frequency of bullace trees in the fences of the western coast of Cardiganshire, and Pembrokeshire, with the size of the fruit, shew the natural geniality of the climature for the production of superior fruit. In more inland places, sloes are frequent, and bullace very rare.

1. *Sycamore*, or greater maple (*acer major*, or *pseudo-platanus*), in Welsh, *masarn*.—"No tree yet known so proper to be planted near the sea; where I have known it to grow luxuriantly, after many other kinds had been tried in vain; and in a few years, the shelter of the sycamore will cherish and bring forwards many hardy sorts, which no art will otherwise effect. I have not had experience, whether the Norway maple (with leaves like those of the plane

plane tree) be as hardy as our sycamore, near the sea: in other situations they are equally so, and of as free growth, much handsomer, and their leaves not so objectionable in enticing insects, and spoiling the sward wherever they fall in autumn."—*Boutcher*.

There are no trees easier propagated, or of quicker growth, and no wood is in greater request for the purposes of the dairy, than sycamore; yet they are become scarce in the country; and turners are much fewer in number than formerly.

2. *Birch* (*betula alba*), in Welsh, *bedw*. "Birch, though one of the hardest trees our climate produces, yet is seldom successfully raised from seeds, which is generally owing to too much covering, as the plants when young are delicate, and unable to push themselves through depth of soil. Clapping in the seeds with the back of the spade, upon fine mould, is all the moulding they require."—*Boutcher*.

3. "The *Larch* is a native of the Alps and Pyrenees, and thrives in elevated situations. It rejects no kind of soil that is dry, but in wet lands it will not succeed. A ship built of this wood was found submerged in the Numidian sea; and no part of it had perished, after being 1400 years under water."

"The cause that larch decline so much from the western winds, is their being unskilfully pruned too much. When the side branches are cut, the length of the leading shoot is too much increased, the body becomes slender, and the tree naturally bends with its own weight."—*B*.

Mountain sheep, mischievous as they are, are not found to injure larch as much as they do other trees—
beech,

beech, elm, oak, ash, &c.: larch is supposed not to be palatable to them, excepting in cases of extreme necessity, when snow covers the ground, &c. They injure larch mostly by their wool sticking to the branches, and thereby apparently impeding the circulation.

4. *Ash* will grow in very sterile soil, and in the most exposed situations; but in deep mould, though of no generous quality, and where there is no standing water, it will quickly arrive at a great magnitude.

No tree so soon exhausts the soil as the ash, and its shade is malignant to every production of the earth, being as it were a step-dame to other trees. Let them be planted in concert, where, notwithstanding these unfriendly qualities, they will yield great profit in a few years.

“An acre of very bad soil, sterile red clay and peat, in 23 years produced ash trees of the value of 115*l.* 10*s.* being upwards of 5*l.* per acre per year.”—*B.*

5. *Elms.* “In thin hungry soils, it is wonderful with how many difficulties the *Dutch elm* will struggle, and soon become a large tree: but in such unfriendly situations, the *English elm* must be courted; *i. e.* they must be planted on the surface, and have mounds of good earth gathered about them. The wood of the *Dutch elm* is inferior to that of other elms; but nevertheless it is a valuable tree; especially as it will flourish where few trees, save aquatics, will.

“Ignorant carpenters think the wood of the Scotch, or wych elm, superior to that of the English: but I have frequently weighed a cubic foot of each, cut at the same time; and always found the English the
closes

closest grain, and most ponderous. I have sold English elms, 24 years old, about 60 in a line, for one guinea each: they were 18 inches diameter at one foot above ground, and 40 feet high."—*B.*

In Montgomeryshire, and other inland parts, the wych kind is the only indigenous elm; and, in common estimation, is held of higher value than the smaller leaved and rougher barked kind, called there the "Worcestershire elm. The latter, however, is the only elm found native in the western coasts of the counties of Cardigan and Pembroke, and on the southern limestone tract.

6. *Beech* is the best of any tree for lofty espalier hedges, or fences to shelter barren fields, as it affords the same protection as an evergreen. Amazing it were not more universally planted. It will grow in poor, stony, sandy, or gravelly soils; insinuating its roots into places impenetrable to others."

"Pruning young beech is a prevalent error: no tree is less able to bear the operation: it should always be pruned the season previous to that of its transplantation."—*B.*

7. The Western, or Virginian *Plane Tree*, grows freely from cuttings set in March: the cuttings a foot or fourteen inches long, and planted about eight inches deep; and moderately watered till the shoots are two or three inches long. In two years they may be transplanted.

"The leaves of this plane are broader, and less indented than either the oriental or the Spanish plane: it is also hardier, grows faster, and to a greater magnitude in this climate."—*B.*

8. "*Horn-*

8. "*Hornbeam* is one of the hardiest trees known: the many good qualities of the wood, the sudden shelter and warmth hedges of it afford, give it a claim to our attention; especially in the cold and more exposed parts of the country. It will grow surprisingly on the coldest hills, and in the stiffest barren ground; nor do I know any useful timber tree that maintains itself so stoutly against the winds; so that being of quick growth, and clad in its numerous leaves all winter, it is certainly one of the fittest plants to nurse and rear up other valuable or delicate trees. The wood is tough, white, and flexible: for mill-cogs it excels the yew itself. It is useful also for stocks, and implements of husbandry. It is lasting fire-wood, and burns as bright as a candle."—B.

Mill-cogs were formerly mostly made in many parts of Wales of the crab tree, and sometimes of holly. Latterly oak, with the bastard cleft or grain exposed to the friction, is preferred.

9. "The *Wild Cherry* tree, for its stately size, fine form, beautiful and fragrant flowers, the various uses of the fruit, and value of the timber, deserves well a place among forest-trees, whether for ornament or for use. It delights in dry sandy loam: it will grow to a large size in most dry soils, though poor and thin; but in wet stiff clay, it will not succeed to advantage. It is one of our hardiest trees, of quick growth; and its many good qualities considered, it is a wonder that it is not more universally planted. The wood is hard, ponderous, and durable; and in considerable request for chairs, tables, &c."—B.

10. The *Bird Cherry* (*prunus padus*), called in Scotland

Scotland the hag-berry, and in Wales *Rhuddwern* and *Llwyngwr*: "This tree is placed in the third or lowest class; that is, from fifteen to thirty feet high; yet I have seen it above forty feet; and have raised many above thirty, at sixteen years old. It is *extremely hardy*, and will grow in almost any soil; but in deep feeding mould, it will make great advances suddenly. The wood is useful for many different purposes of husbandry."—*B.*

Though this shrub, together with the spindle and dog-trees, are pretty common in the fences of East Wales; yet we did not observe a single plant of either of them in the counties of Cardigan and Pembroke.

The bird cherry grows freely from cuttings, which, together with those of brown willow and elder, might be struck into the summits of mound fences, so as quickly to form hedges in exposed situations. The fruit of the wild bullace dibbled among such cuttings, might in time make the fence more impenetrable.

11. The *Laburnum* (*hanadl ffrainge*) "are easily raised from seed; and will succeed in various soils, even in the poor and hungry: though where there is a considerable depth, its progress is amazing. Its wood is by some preferred to mahogany; being close-grained, and beautifully coloured. Hares will not browse any other tree, as long as any of the laburnum remains in a plantation; and though eat to the ground every winter, it will spring with additional vigour the succeeding summer. The produce of a few shillings worth of seed, will furnish plants enow to protect half a million of other trees."—*B.*

"The laburnum, the ilex, or evergreen oak, and the pineaster,

pineaster, are hardy; but they have scarcely strength enough for the outsides of plantations in bleak exposures."—*Mr. Milne.*

12. The *Elder Tree* (*pren ysgaw*) "will grow amazingly fast in all kinds of soil, where thorns, &c. will not succeed; by putting in stakes of elder, of four, five, or six years' growth, about three feet high, planted a foot deep, and about a foot asunder, you may in three years have hedges that will resist the wildest cattle, and by their warmth much improve the ground. These hedges being pruned close to the body of the plants every third or fourth year, will branch out again more numerous than ever. Elder might also be used to much advantage in better situations, intended for plantations of the most valuable forest-trees, by planting them thick in lines across the most exposed places of the field; where, by their quick growth, and the excellent protection they afford, they will highly contribute to the speedy advance of such plantations; and the elders may be cut down by degrees, when their protection is no more wanted."—*B.*

Elder seems to be the most patient of shade of any shrub we know. We have seen it in one instance grown up through the thick canopy of a lofty yew tree, at least 30 feet high.

13. The *Cedar of Litanus*: When five or six years old, no plant will better endure our most severe seasons, or grow in more forbidding and hungry soil: the largest trees of them now known in the world, grow in the coldest and most exposed places, covered a great part of the year with snow; from which it cannot be doubted

doubted but that they might become a great ornament and valuable improvement, if generally planted in Britain; the wood being of such great value."—B.

14. *The Spanish Chesnut Tree*: "In fifteen years from the seed, a plantation of it will produce more than double the rent and labour: and in 40 or 50 years you will have a forest of noble timber trees, worth more than the fee simple value of the land. They will in the mean time also produce fruit, but nothing equal to those in the true orchard culture. The best soil for orchards, is a loose moist gravel or sand, or mixed pebbly soil. For plantations of timber, you can hardly miss the soil, so there be depth, without standing water. They will grow on obstinate clay, and on the bleakest declivities of hills."

"The timber will last longer than oak or elm, in pipes for under-ground works."—B.

This latter opinion respecting the superior durability of chesnut wood, is confirmed by the observation of Mr. John Williams, author of "The Natural History of the Mineral Kingdom," who, in a letter from Verona to his nephew, Mr. John Williams, of Kerry, in Montgomeryshire, says,

"I have at length found out what I have for many years been in quest of, without success—that is, what wood will endure longest, without decay, in underground works; it is the *Spanish chesnut*, which I have found here in an old Roman mine, and the wood is now as sound as when first put in, about two thousand years ago; save only about a quarter of an inch thickness on the outer side, which is somewhat decayed*.

* We intend a short biographical sketch of this our countryman, whose history seems to be little known, in Chap. XIV. Sect. 3, on *Fuel*.

15. *Pines and Firs*: "A main generic difference between pines and firs is this; the former have downright roots with few fibres; the latter, on the contrary, spread near the surface, produce plenty of fibres, and, in general, do not grow near the size of the pines the first year. Hence an obvious difference in their culture: the *pines* ought to be removed the first year, cutting their carrotty roots; the *firs* may be left two years in the seminary; and for that reason ought to be sown thinner than the pines."

"It is surprising why Scots pine (commonly called Scots fir) should be permitted to engross whole and extensive plantations. The spruce fir far surpasses it in growth; and is moreover a more valuable timber. The spruce fir makes excellent evergreen hedges, to shelter gardens, &c. in cold situations. They are strong fences, grow amazingly fast; sheep and cattle do not annoy them; and by clipping them in moist weather, when they begin to shoot in the spring, thin at top, and gradually thicker to the bottom, they will continue many years beautiful and verdant."—*B.*

"In many places in the northern parts of the county, the spruce firs, between 20 and 30 years old, have died off; and this in so many different soils and situations, that now they are in a great measure discarded: the cause of this failure has not yet been well accounted for."—*Messrs. Bailey and Culley, in Northumberland.*

"This is observable elsewhere, and serves to shew that the Norway spruce is not adapted to the soil or the climate of England."—*Marshall's Review.*

Firs as well as pines, when permitted to run to too great a length in the nursery, and from thence transplanted into cold exposures, seldom succeed well. Formerly

merly, transplanting trees of a large size was too common a practice. Upon a small scale, for immediate shew, or speedier shelter, with proper care and attention in planting, watering, and replacing the mould or soil after every storm of wind, it may answer expectation; but as planting upon a large scale is now the prevailing practice, trees of two or three years growth, once transplanted in the nursery, are very properly preferred for exposed situations: such plants strike root before the strong winds have any injurious effect upon them.

Spruce firs of a moderate age, afford timber of better quality than Scots pines of equal age: but the latter, left to grow to a proper age, which seldom happens, are said to be equal to any foreign imported deal: at least such was our information at Gwedir, in the Valley of Llanrwst, where very old pines were felled some years back.

The Scots pine is the only tree of the evergreen genus (firs and pines) that propagates itself by seed from its cones in this district; and that indeed in very few places. Mr. Clark, in his Radnorshire, p. 29, says—"It hath been taken for granted, that the Scots fir was not capable of planting itself in this latitude; and I have not met with a single instance, where the fir rose from the seed's dropping out of the cone as it fell from the tree, without being sown in a seed bed, except in the northern part of this island, where large forests are known to have risen by the mere operations of nature, without any interference on the part of man: at Pen-Carreg, near Llandrindod Wells, in Radnorshire, however, I have found the fact to be otherwise."

We found self-sown pines also at Llidiardau, in the
S. WALES. VOL. II.] . F Valley

Valley of Har, in Cardiganshire, and at Manafon in Montgomeryshire.

“ On the estate of Mr. James Thomas, of Maer dy Newydd, in Glamorganshire, the Scots pine propagates itself from a number of trees planted by the proprietor from 30 to 40 years ago: the fallen and dispersed seed vegetate, and numerous, in the neighbourhood of the hand-planted trees. It is said that this spontaneous growth is observable elsewhere, especially in the Glamorgan mountain tract; also in Hensol-Park.”—*E. W.*

Instances of self-sown pines would be more frequent, were circumstances to favour their growth more common. Under the close cover of a plantation, seeds cannot be expected to vegetate to perfection; and if the seeds are blown out of the plantation, into either arable, meadow, or pasture land, the infant plants will be destroyed by the plough, the scythe, or the grazing of stock, before they are observed.

As the strongest winds are from the south-west to the north, such self-propagated pines might be expected in a non-frequented enclosure, bearing only tufts of furze or fern, to the east or south of cone-bearing pines.

That Norway, or even Scotland, should be naturally more productive of these kinds of trees than this country, may be owing to a more suitable solar influence during the longer days, in those more northern latitudes.

Influence of Woods on Climature.

“ Were the hills of Cardigan Upper well covered with wood, the climature of the situation would be much improved; and stock and tillage would reap a consequent benefit.”—*Mr. Turner*, p. 21.

“ What good reasons had Mr. Turner for thinking so?

so? and where is that country whose hills are covered with wood, to exemplify such an hypothesis? Where the sides of hills are too steep for the plough, and at the same time sheltered from sea air, &c., let them be planted; they cannot be disposed of to more advantage: but were the tops of hills covered with wood, supposing that this was possible in this county, it would only keep more of the morning, noon, and evening sun from the valleys, already too much deprived of it, and render the climature still more ungenial."—*E. W.*

"Woods planted on Mr. Turnor's hypothesis, would be more advantageous than otherwise: their effect in keeping off the sun, would operate but partially, near the margins of the woods."—*W. D.*

CHAP. XI.

WASTES.

ORIGINALLY, all the island might have been termed a *waste*. The first settlers, of the agricultural cast, chose particular tracts for the cultivation of grain: these increased in number and size, in proportion to the increase of population. Of the golden age of equality, when every individual exercised an equal right to the property of the soil, we have no account, save from the illusory dreams of the fanciful democrat: indeed such a state of society seems incompatible with the natural history of man. In the fifth and sixth centuries, when the barbarous nations overturned most of the European governments, every warrior became a freeholder, by the absolute right of conquest: he acknowledged no superior, to whom either rent, homage, or service, were due. In course of time, it was found convenient, if not necessary, to convert these independent allodial links into one feudal chain. Means were contrived to render the barter of tenures a voluntary choice, rather than a compulsory act. The military taste of the times, the many privileges annexed to a feudal tenure, and the mutual protection it afforded to individuals, were such strong incitements, that few chose to continue their independent allodial tenures in those troublesome days: they therefore surrendered them to the chief of the nation, upon condition of their receiving them back in fiefs.

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After various revolutions in tenures, the property in *waste lands* or *commons* is now divided: the lord of the manor claims the minerals, fossils, or whatever is of value *beneath* the sod; the lords of the soil, the freeholders, claim and exercise the right of depasturing whatever grows *upon* the sod, within their respective townships or other parochial divisions; and that mostly by a kind of commonage, without stint.

Brakes of underwood on wastes are, in many places, considered as the property of the freeholders: in other places, by the use of threats, and sometimes of arbitrary punishments, they are protected from the depredations of cottagers for fuel, or of farmers for trowse, until the wood grows into saplings or young trees: from thenceforward no person, without permission from the lord of the manor, dares cut them with impunity.

The manorial right to wastes, originally in the Crown, is still either in it, or transferred from it, into private hands or corporate bodies, by grants and charters.

Formerly, most of the proprietors, residing on their estates adjoining wastes, made gradual encroachments thereon; which, unless exceedingly extravagant, were seldom noticed at the lord's courts: this enriched the freeholders at the expense of the lord. It seems to be but of late, that fines and amerciaments were resorted to; and apparently to check encroachments, but in reality, to secure the fee-simple of the encroachments to the lord, after receiving amerciaments for 20 years: this reversed the case, and tended to enrich the lord, by greatly extending his enclosed territory, at the expense, or diminution of the sheep-walks of the freeholders.

The frequency and extent of such encroachments in
F 3 many

many instances, contributed more towards the obtaining of several Acts of Enclosure than all the pamphlets written on the expediency of enclosing; than even the unwearied efforts of Agricultural Boards and Societies. The extent and number of such legal enclosures from the wastes, will be found in a table in the sequel of this Chapter.

Wales is a term, in the idea of a stranger, that bespeaks a wild uncultivated country. It is not all a waste; but when we consider the extent of its mountains, we must allow that a considerable portion of its territory must fall under that description. We have already calculated the superficies of the six counties of South Wales at 2,711,680 acres; whereof, at a low estimate, there may be about 750,000 acres of wastes; to which, if we add private property, in every respect in the state of waste land, the total cannot be much less than a million of acres, in a comparatively unproductive state.

We shall enter some particulars respecting the *wastes* of each county separately:

I. Radnorshire,

In proportion to its extent, has a greater quantity of open wastes, than any other county in South Wales.

Mr. Clark, in the Original Report, divided the county as under:

	Acres.
" Tillage land,	86,000
Meadows, pastures, and woods,	40,000
Wastes,	200,000
	<hr/>
	326,000"
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The wastes are above stated to be nearly two-thirds of the whole county ; or nearly double the enclosed lands.

Mr. Clark's animadversions on the extent of these wastes, and their influence on the industry, or rather the indolence of the hill farmers, &c. are so copious, that we shall satisfy ourselves, and perhaps the public, with inserting here only " a part for the whole."

" The *common mountains or waste lands*, will perhaps enable us, in some measure, to account for that slovenly practice of husbandry, which has called forth a severity of well-meant animadversions, which nothing but truth could justify, and which no other motive than a sincere wish to see it in some degree removed, could induce the writer to impose upon himself the unpleasant task of bringing forward to public inspection: he would be peculiarly thankful to that individual that would shew him that things were better than he hath represented them.

" When it is remembered that nearly two-thirds of the lands in this county lie waste, and, of course, are of no more intrinsic value to the inhabitants than they were a thousand years ago, reflections of a very humiliating nature obtrude themselves on the dejected mind. The breast that is warmed by the animating beams of patriotism, must be peculiarly hurt by the unpleasant reflection, that while so many of our brave countrymen are compelled to find bread by the cultivation of a foreign soil, so large a portion of a county in our own island, should be suffered to lie in the original state in which nature formed it; and that by a degree of indolence, which must excite the wonder of succeeding ages, we should leave in the uncultivated soil, that portion of the food of society, which a great part of the land is so capable of yielding to the hand of industry: yet I
F 4 know

know some men in this county, of whose judgment and patriotism I have the highest opinion, who are pretty well satisfied with the waste lands in their present state, because they support a number of sheep and young cattle in summer, at no expense. All this is true; but it is equally true, that although a shilling be of some value, a guinea is still more so. If, therefore, one acre can be made to produce as much food for society as twenty-one do in their present neglected state, the public at large, as well as the land-owners, would be benefited by a general enclosure of the waste lands in the kingdom. Fifty thousand acres (a fourth part only of the waste lands in this county) would furnish food and employment for ten thousand people more than it now contains; and many of the labourers who are now obliged to find bread in other districts, might live comfortably by cultivating their own native soil.

“ That the tenants in this county would, in general, consider themselves injured by enclosing the wastes, I have reason to believe. It is not very difficult to point out the cause. When a farm is to be let, in valuing the land, the advantage to be derived from the adjoining common is seldom, if ever, taken into consideration. Whatever little profit the tenant makes by his cattle depasturing the commons in their present state, he considers as clear gain, because he pays neither rent nor taxes for it; but if these lands had been divided, and his landlord's share marked out for him, he would, of course, expect some rent for it. Here rests the root of the whole evil; and here too these destructive resources of indolence, which, by furnishing him with the means of a scanty subsistence in the mean time, enables him to slumber on, one year after another, and by neglecting the cultivation of his land, shuts the door

door against the entrance of that wealth, which might have enabled himself and family, in place of the absolute necessities of life, to partake of the comforts, and, in some degree, the luxuries of society.

“Should the waste lands in this county be enclosed, 50,000 acres might be converted into tillage, 50,000 planted, and 100,000 acres be employed in pasture.

“The advantage which would attend enclosure, may be easily ascertained by any one who will take the trouble of examining the very different appearance which the small slices that are occasionally stolen from the common, make after enclosure, from that of the remaining part of the waste.”—*Mr. Clark.*

“The extensive wastes of this county having been estimated to contain no less than 200,000 acres, are mostly appropriated to the depasturing of sheep; though small horses and young cattle are frequently depastured in summer on the low and more fertile parts. Many acres of these wastes have from time to time been enclosed by persons who have property adjoining, and no small quantity by cottagers, who have been permitted in the first instance to erect their huts; and what was at the same time allowed for a garden, has, by gradual encroachment, in some cases, become acres of land. In some parts of the county, enclosures have been made by the mutual consent of the parties concerned; and within the few last years, Acts of Parliament have been obtained to enclose the wastes in the parishes of Gladestry, New Radnor, and Diserth; and the procuring of others is in agitation.”—*Rev. W. J. Rees, 1813.*

The Radnorshire wastes may be divided into three classes: 1. Those of the western and northern hills, adjoining the counties of Cardigan and Montgomery, and altogether on the slate tract. These form the greater

greater part of the wastes of the county; are elevated and bleak, and, in many instances, extending several miles without either an enclosure or dwelling. The enclosure of these wastes, by the present tedious and expensive mode or petitioning for separate acts, and their subsequent improvement in fencing, draining, &c. would be attended with certain heavy expenses, and with very precarious profits. Mr. Clark has proposed planting 50,000 acres of the wastes of this county; this would be attended with an expense of about 100,000*l.* exclusive of fencing; and unless nurseries for raising forest trees be formed previously within or near the tracts to be planted, and the trees planted at two or three years' growth, the expense would be still more considerable. Much of these wastes, for reasons hereafter to be given, would better be left to remain in their present state for sheep-walks; at least so far, until the more improveable wastes, in other parts, have first been all enclosed.

2. Flat wastes in the interior of the county, and within the slate tract, such as those about the Llandrindod Spa, &c. These contain several thousand acres, and in their present state are unproductive, owing to the soil being mostly a retentive clay, in some places under a few inches of peat earth. The enclosure of the Llandrindod and Llanir commons, would contribute much to the improvement of the vicinity of these celebrated medicinal springs; fences and open-drains, in proper directions, would render the air milder, and more salubrious for invalids and others, by promoting the discharge of superfluous water; hay and corn would be more abundant. The disadvantages attending these enclosures would be, 1. The dearth of lime,

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con Canal, under the great necessity for it as a corrector of such soil. 2. Travelling across these wastes in winter, is attended at present with some difficulty; were they enclosed, and consequently the roads confined to a certain breadth between the fences, with few or no materials at hand for forming them, between the months of October and May, travelling would become ten times more difficult, if at all practicable. Commissioners of enclosures are very apt to employ men to throw up new roads over such wet wastes; but if left by them in that unfinished state, they will have done the public a great injury, in meddling with them at all; for the original tough sod is a much more durable road in winter than puddled clay. Commissioners should be bound by the Act, to complete the whole roads over the wastes with a good covering of stones, surfaced over with fine shale or gravel: otherwise, if left by them only thrown up, the roads will be totally impassable for man or beast the first winter; and for the townships to cover such new modelled clayey roads, where materials lie at a great distance, would be a ruinous expense to the poorer tenants. That such new roads have been sufficiently completed by the Commissioners, should be certified in the usual mode by two magistrates, who will have occasion themselves to travel such roads frequently in the winter months; in such a case, the enclosure of such wastes would be a blessing, otherwise a curse to the neighbourhood.

3. The *third* class of wastes in this county, consists of the outskirts of the mountainous range called the Forest of Radnor, and other commons lying on the red sandstone and grey mountain rocks, in the eastern and southern parts of the county. These consist mostly of sound hazel mould, or ferny soils; and are to be ranked

ranked among the valuable wastes of the district. Sheep brought from the slate tract to graze upon these wastes, soon improve the quality of their wool, and *vice versa*.

"Were these wastes enclosed and cultivated, they would produce excellent crops of turnips, barley, and clover, and also wheat on the first year's clover ley."—*Mr. Weyman*.

"For every 300*l.* laid out in the improvement of these wastes, I am positive that in ten years they would give a return of 100*l.* a year: this would be equal to the buying of estates at about five years' purchase."—*Mr. Price*.

II. Brecknockshire.

"The outskirts of this county, for the most part, consist of lofty mountains, *superficially* barren, except where it is separated from the county of Radnor by the river Wye, on the north. It is interspersed with hills almost throughout. In the lower part of the county, the hillocks, and even the hills, are cultivated a considerable way up, and some of them to the top: but the higher mountains are in general very barren, and to the farmer of little use or value."—*Mr. Clark, in Original Report*.

"The mountains separating this county from Glamorganshire and Caermarthenshire, produce coarse grasses for an innumerable store of cattle and sheep: such wastes are well stocked, return thousands of pounds a year into the county, and not a tenth part can be adapted to any other use, owing to rocks and bogs, and their high situation in the atmosphere."—*Note by Anonymous*.

"Breck-

" Brecknockshire (according to Mr. Clark) contains about 512,000 acres, which may be divided in the following manner :

	<i>Acres.</i>
" Good land	128,000
Middling land	96,000
Poor mountainous land	102,400
Open wastes or commons	185,600
	<hr/> 512,000" <hr/>

The open wastes or common mountains, are here estimated at more than a third part of the whole county, and considerably more than one-half of the quantity of enclosed land.

Mr. Clark, in p. 39, advances the acreage of the wastes to 256,000, or one half of the whole county, and adds, " The principal stock kept upon these extensive mountains, is sheep ; some horned cattle and horses are also depastured thereon in summer, but the number is not considerable, because the farmers, by neglecting the cultivation of their enclosed land, have not sufficient keep for them in winter. In many places, therefore, the commons are sufficient to keep in summer three times more stock than the parishioners can send there."

" Whoever will examine the state of agriculture in the vicinity of all the extensive mountainous commons in this island, will hazard little in risking it as a general remark, that the cultivation of the enclosed lands is neglected in a very *uncommon* degree ; and that a national loss, to a very considerable amount, is annually sustained by the public, in consequence of such neglect. It is not difficult to account for this, when it

now covered with trees of various kinds; but the *oak* is the great favourite of the soil.

“The remainder of this land ought to be used in the depasturing of sheep and cattle, *as at present*. Great part of these mountains, in their present state, are not only *useless*, but *hurtful*, to the sheep especially, on account of the waters being suffered to take *their own* course down the sides of these mountains, and destroy such immense tracts of land. This nuisance can never be removed while these commons remain in their *present state*; but were they enclosed, the water would be diverted into channels that would relieve the ground from the fatal ravages of this enemy.

“From the great extent of the commons, and from the narrowness of the cultivated valleys that surround them, I do not think that any method could be devised to correct the present mode of commonage.”—*Mr. Clark.*

The wastes of Brecknockshire may be divided into three ranges:

1. The Talgarth Black Mountains, and their appendages, connected with the Hatterel Hills in Herefordshire, and extending in this county, southwardly, from the Hay on the Wye, to Crickhowell on the Usk: these mountains are elevated and extensive, near 20,000 acres of them being claimed as sheep-walks by the inhabitants of one parish. Their soil, lying upon red sandstone, and some limestone, produces good herbage for sheep and young cattle: their outskirts, if enclosed, might be cultivated to advantage; especially in parts adjacent to the line of detached lime-rocks, already noticed in Chap. I. Sect. 4, on *Soil and Surface*.

2. The mountains constituting the middle range of limestone, with its subjacent accompaniment of red sandstone,

sandstone, already described; and running, south of the Usk, between it and the coal tract, in a west by south direction, from the Bloreng to the Brecon and Treecastle Beacons, the highest summits in South Wales: much of this tract is too elevated, steep, and rocky, for cultivation; wherever the soil is otherwise, enclosures may be undertaken with success. On this range, in the extremity of the county, adjoining the counties of Caermarthen and Glamorgan, lies the *Great Forest of Brecon*, a Crown manor, whose wastes, by admeasurement, contain 41,324 acres. The enclosure of the Drum Mountain, in the parish of Ystrad Gynlas, and part of this manor, is now on the tapis. This same chain of wastes continues its progress, with the same characteristics, but gradually diminishing in height and extent, from the borders of this county, through that of Caermarthen, towards the mouth of the Towy. The most elevated summits of this range in Caermarthenshire, are denominated *Black Mountains*, like those of Talgarth in Brecknockshire; either figuratively, from their dreary bleakness, or from their dark appearance when their coat of heath is out of blossom.

3. The *Eppynt Hills*, commencing, in this county, upon the Wye, between Llanddewi'r Cwm and Crugcadarn, and extending with a pretty uniform outline to the borders of Caermarthenshire; where they are connected with that extensive chain of mountains which separates the vales of the Towy and Teivy; and, excepting a few intersections by transverse brooks and ravines, continues its progress westward, in the Perselly range, through Pembrokeshire towards Fishgard.

The eastern part of this vast range lies upon red sandstone, and some grey mountain rock, producing better herbage for sheep, and consequently clothing them

WASTES.

finer wool, than the middle and western parts, are in the blueish shale tract. This shale, as noticed, is intersected, here and there, by veins of mountain rock, some blue slate, and freestone.

of the coal and limestone, the shale and slate veins have, upon their western extremities, within miles of Cardigan Bay, vast masses of siliceous material analogous to those of North Wales—whinstone, chert, bastard chert, breccia, puddingstone, &c. The western coasts are also crowded with alluvial deposits, the arable land being full of rounded pebbles and in the tract between Newport and Vrenni &c. these pebbles and nodules consist almost entirely of quartz; which, from its general colour, is supposed to have given names to Llanvair Nant-gwyn, church, &c.

The Eppynt range, is connected with the Pumlumon range, on the borders of Montgomeryshire, by a

tance of thirty or forty miles; and to think of planting such vast and elevated tracts, would be the commencement of hostilities against Nature. These wastes are, however, productive of a great supply of excellent mountain mutton; and may they for ever remain so! excepting in a few instances, where prudent cultivation and planting may succeed. If the *florin* grass merits half the encomiums bestowed upon it, such tracts as these should undergo the experiment.

III. Glamorganshire.

“About three-fourths of the county is enclosed.”—*Mr. Franklen.*

This agrees very well with the common estimate, that the wastes of the county contain upwards of 100,000 acres. These may be divided into two classes:

1. The wastes, commons, or downs, of the southern limestone tract, from the Romney near Cardiff, to Worms-Head Point, in the western extremity of Gower. These, including some warrens and sandbanks on the coast, may amount to about 14,000 acres. Parts of some waste tracts, such as Cardiff Heath, the New Forest near Cowbridge, &c. have been enclosed; the amount of which will be found in the Table in the sequel of this Chapter. Many of these wastes, and especially those of St. Mary Hill, in the Vale of Glamorgan, and Cefn y Bryn Hill, in Gower, produce the sweetest herbage imaginable; and the sheep grazing thereon are remarkable for the fineness of their wool, and the excellency of their mutton. It is worthy of note, that the wastes here noticed for the sweetness of their grasses, with several others, such as Newton Down, &c. have enormous masses of a whitish sandstone superincum-

bent upon the limestone; and this fine silix, incorporated with the limestone soil, may have assisted in the production of such superior herbage; which consists mostly of white clover, with an admixture of the crested dogs-tail, sweet-scented vernal grass, smooth meadow grass, sheep's fescue, &c. These wastes, mostly level, are of various sizes, from twenty to several hundred acres: many of them are, in their present state, as valuable to sheep farmers as any old pastures: it is difficult, at times, to prevent sheep from breaking into them from the enclosure, as their herbage is so sweet.

2. The remaining 86,000 acres are mostly in the coal tract, or in its immediate vicinity. Some of the outskirts of the mountains, and other tracts of greater elevation, but easily ploughed, such as *Eforest Wladys*, in the parish of Gelli Gaer, &c. consist of sound soils, and are highly improveable, were they divided and enclosed. The wastes in some large parishes occupy from eight to ten thousand acres.

The freeholders in this, and such other mineral tracts, are not over anxious for having the wastes enclosed; for they are aware, that the lords of the respective manors will retain their right to the minerals; so that a freeholder's allotment, when improved at a considerable expense, will always be liable to be entered upon by the lord, or his lessee, to delve for coal and ironstone; so as to have its manured surface, in a short time, covered with several feet or yards depth of mineral refuse.

IV. *Caermarthenshire.*

Mr. Hassall, in the Original Report, estimated the whole acreage of this county at 512,000 acres; about one-third of which, he adds, is unenclosed and waste.

According

According to the scale of Smith's map, Caermarthen-shire contains 593,920 acres; the one-third of which amounts nearly to 198,000 acres of waste.

"Many of these wastes (Mr. Hassall adds, p. 21) are not common; they are appurtenant to the adjacent estates; but for want of dividing them among the tenantry, no enclosure takes place. Out of about 198,000 acres of waste lands, about one-half may be deemed capable of cultivation at a reasonable expense, namely, about 99,000 acres; and the other half not capable of such cultivation, by reason of its elevation, or other difficulties.

"These wastes are now depastured by the occupiers at large, within the several manors to which they belong, without stint; and are thereby rendered of little value to the community; at least they are not so productive as they might be, were some rule established for regulating the depasturing of them.

"Stocks of small sheep are kept upon most of the hills, and a few inferior cattle and horses upon some; but the highest hills do not, as I am informed, keep any stock during the rigorous seasons of winter."

The greatest extent of wastes in this county, lies in the range of hills north-west of the Vale of Towy, in the slate and shale tract. The wastes on the south-east of the Vale, are, first, in the red sandstone tract; secondly, in the middle limestone tract; and thirdly, to a considerable amount, in the coal tract. The black mountains, occupying parts of the three tracts, are very extensive and elevated.

A greater number of acres of waste land have been enclosed, under the sanction of late Acts of Parliament, within this county, than within any other county in South Wales; as will appear by the Table in the sequel.

WASTES.

V. *Pembrokeshire.*

The waste lands in Pembrokeshire are estimated at 22,220 acres: out of which, 14,220 acres are capable of being enclosed and cultivated at a reasonable expense; viz.

<i>Contents.</i>	<i>Contents in Acres.</i>
On the shale and slate tract:	
Llanernach,	4000
Llanbacs,	5000
Llanfellochog,	2500
Llanfellochog-ddu,	1500
On the southern limestone:	
Llanfellochog,	150
On the coal tract, or in its vicinity:	
Llanfellochog, or Haverfordwest race-course,	900
Llanfellochog moor,	170
	<hr/>
	14,220

If we except a few sheep kept by the inferior farmers, living on the verge of these wastes, the profits resulting from them to the public, are very insignificant indeed."

—*Mr. Hassall*, in 1794.

What proportion of the above wastes have been since enclosed, will appear in the sequel.

VI. *Cardiganshire.*

In Cardigan Lower, or that part of the county lying south of the river Aeron, "we have few commons: the largest (supposed to be about 200 acres) is near the town of Cardigan: it is the property of the Corporation and resident Burgesses: it is grazed, but never ploughed. A division is wished; but Acts of Parliament are too expensive."—*Mr. Lloyd, in Original Report.*

This race-course, of 200 acres, has lately been surveyed, preparatory to its division; but obstacles prevented any further progress for the present.

In Cardigan Upper, or that portion of the county north of Aeron, "the wastes unfriendly for cultivation are very extensive; and including the tracts only partially cultivated, may amount to near half the county*. Almost every spot is capable of improvement. Where the plough cannot answer, plantations would be very advantageous.

"This county, in one feature, is not unlike the kingdom at large. There is in it a gradual elevation of surface, terminating nearly in the centre, from almost one extremity to the other. It begins about five miles to the north of Newcastle Emlyn, and is lost in the

* The whole county has been estimated at 464,640 acres; but the greater part of the Cardiganshire wastes are claimed as private property.

bold and lofty hills on the borders of Montgomeryshire. At its commencement, it is of no great breadth, but it expands, in some degree, in its progress northward, as far as the Aeron, where it is intersected by a faithful, though a narrow vale. Thus far it has a great uniformity of surface, chiefly a table-land plain, with many narrow dips, well adapted for plantations. On this back bone of the county, there are many scattered farms, situated in the dips: the easy declivities, and much of the plains near the dwellings, are under corn; but the greatest part of it is still a waste, yielding nothing but heath and moss, its natural productions. After passing the Aeron, it takes a bolder style, more diversified with hills: the declivities are more rapid, and the dips and plains more barren."—*Mr. Turnor, in Original Report.*

Fens.—The two most extensive fens, or moors, in South Wales, are in this county:

1. *Cors goch ar deifi*: This is a flat tract, extending from Tregaron to Strata Florida, about five miles in length, by one mile and a half mean breadth, which makes 4800 acres. The computed estimate, however, is 3000; but taking into the account the wet and flat meadows adjoining, which are scarcely in a better state than the *cors* itself, the whole that wants draining may not be less than 5000 acres. The river Teivy, not far from its source, meanders through it. For the improvement of the fen, a straight channel for the river would be the first step. The deepening of the channel, at its exit out of the fen, is not easily practicable, owing to the Teivy's bed in that part being a slate rock; and the bringing of it by a new channel, so as to fall into the Brennig rivulet, above Tregaron, would be attended

ed with still greater difficulty. Dr. Anderson, however, when he viewed the fen, at Mr. Johnes's request, is said to have given his opinion, that if he had it near him, he could bring it to produce good crops of wheat in five years. It is, however, at a very discouraging distance from lime, the nearest kilns being those at Aberystwyth, where the stone is brought from Pembrokeshire, and the coal from Milford or Swansea. The situation is also high, being so near the source of the Teivy, which makes a course, in many places rapid, of 53 miles down to Cardigan Bar. The fen also affords, in its present state, the most excellent peat fuel in the Principality, in inexhaustible quantities: a peat mine therein, belonging to one farm, letting for 70*l.* a-year. Were it drained and improved, of which there is at present no prospect, the inhabitants of the vicinity must be sent up higher into the hills for fuel, coal being scarcely procurable, owing to great distance from the sea coast, where the coal-tax operates most grievously. This fen is private property; the greater part belonging to Lord Lisburne, a considerable portion to Mr. Johnes, &c. In time of flood, it appears from the adjacent rising grounds like an immense lake: this is only temporary: it afterwards presents its wonted dreary aspect; though in season it is enlivened by various tribes of water-fowl, wild geese, ducks, teals, coots, &c.: but were it improved, divided into fields, intersected by canals, and the boundaries planted with suitable trees, the prospect of a fine vale beneath, would be highly gratifying to the inhabitants of Ystrad Meirig, &c.

2. A fen, similar in some respects to the foregoing, is that of *Cors Vecho*, in the northern corner of the county,

WASTES.

and adjoining the mouth of the Dovey, where
Cardigan Bay. It contains :

	<i>Acres.</i>
land, or salt marshes, on the Dovey,	3000
ary, or moss,	3000
s,	3500
	<hr/>
In all,	9500
	<hr/>

al years back, this fen is said to have been
by a company of Dutch adventurers, skilled in
ing such tracts; probably the same company as
proposals for the embankment, &c. of Traeth
ands in North Wales, in the year 1719. Here,
h Wales, their proposals were, to reclaim the
for half the land so reclaimed, in perpetuity, to
nd their assigns. The scheme came to nothing ;
fen still continues in its natural state. It is,

nech, St. Clare's, &c. in Caermarthenshire; have been improved. Those of Kidwelly, Penbre, and St. Ishmael's, in the same county, are in agitation; with many others, some reclaimed, and some intended.

WASTES.

Glamorganshire	1763	—	600
Pembrokeshire	1787	500 acres	1826
Ditto	1790	—	274
Glamorganshire	1800	One-eighteenth	1100
Ditto	1801	—	250
Caernarthenshire	1807	One-twentieth	980
Ditto	1808	One-fourteenth	1300
Ditto	1808	Ditto	400
Ditto	1809	Ditto	1500
Pembrokeshire	1809	Ditto	3000
Radnorshire	1809	—	500
Caernarthenshire	1810	Ditto	400
Radnorshire	1810	—	700
Ditto	1811	—	1600
Ditto	1811	—	1100
Ditto	1811	—	500
Caernarthenshire	1811	—	2200
Ditto	1812	Ditto	800
Ditto	1812	Ditto	4700
Ditto	1812	Ditto	1500
Ditto	1812	Ditto	900
Cardiganshire	1812	—	—
Ditto	1812	One-twentieth	4500
Pembrokeshire	1813	—	7000
	1811	—	500

Some further Account of the Enclosures included in the foregoing Table.

No. 1. *Swansea Hill and Burrows*—The *Hill* is situate near the town of Swansea; the *Burrows* is a small parcel of land along the sea shore; both on the southern verge of the coal tract, and the property of the Corporation of Swansea.

2. *Narberth Forest* was well wooded over 870 acres, and stocked with red deer, in the reign of James I. The whole is now converted into well cultivated farms, interspersed with small portions of copse-wood. The lord of the manor agreed to accept 500 acres for his share, as owner of estates and royalties. The intermediate tracts of red sandstone, and middle limestone, are here contracted into a narrow breadth between the tracts of shale, &c. on the north, and coal on the south.

3. *Castle Martin Cors*—or the *Carse* of Castle Martin, consisted mostly of very spongy peat or moss upon a substratum of clay: though the depth of the peat, in the central parts, has not yet been ascertained. Some neighbouring copy-holders exercised the right of commonage upon it; but their loss frequently overbalanced their profit, in having their cattle engulfed in the sloughs. The situation is a flat between two hills, about two miles in length, and open to the sea on the west. Lord Cawdor, paying a consideration to other claimants, procured an Act, cut a main drain, and laid down a tunnel, to discharge the water through sandbanks into the sea. He then leased the Cors to Mr. Mirehouse, who undertook the complete drainage thereof.

of. He first formed channels on the four sides, with transverse intermediate drains communicating with the central trunk, and with its parallel master drains on the hill sides, which were cut to drain the springs issuing from the hills on both sides. The drains were commonly 39 inches deep, 20 inches wide at top, tapering to 6 inches at bottom. The effect of the draining was soon visible; and the succeeding operations of tillage and grazing, co-operated in reducing the spungy soil to so much less bulk, that the drains became too shallow to be useful. This was remedied by deepening the drains, and the tunnel, so as to be adequate to their intended purposes.

The Cors was divided into twelve pieces, by double ditches, of such depth as the fall would allow. Between the ditches, a space of from 30 to 40 feet was left for planting willow.

Mr. Mirehouse has tried several courses of crops on this reclaimed waste, but the following he has found to be the most profitable: viz. 1. Pare the surface with a Dutch plough, and burn; sow cole-seed, which grows so luxuriant as to be five feet high, and extends its foliage like an umbrella, so as to shelter sheep under its canopy. 2. Oats in the following spring, which generally produce good returns. One year in particular, a bushel and a half only, sown per acre, produced 96 bushels: 36 stems were numbered on one root. 3. As soon as the oats are off the land, pare again with a plough, and burn; sow wheat, sometimes under, and sometimes upon the furrow: the two methods, in the same field and season, have been tried by way of experiment, to see whether the under-furrow method would not secure the crop better from lodging; no difference however was observed. 4. Upon the wheat sow grass seeds;

seeds; and in the second summer, graze with cattle and sheep.

On this land, cole-seed, wheat, and oats, succeed well; but barley does not.

Mr. Minehouse's expenses in reclaiming this waste, (as laid before the Society of Arts, who honoured him with a gold medal in the year 1801) was 500*l*.

About 100 acres are now under tillage; the remaining 174 acres yield abundance of hay and pasture.

4. *Cardiff Heath* is on the northern verge of the southern limestone tract. The whole heath is said to have contained about 2000 acres; 1100 of which have been enclosed under the Act: the remainder is still an open common, and is found convenient for the celebration of Cardiff races. The soil is various; sandy loam, clay, rammel, peat earth: the best parts produce excellent crops; and the more ungrateful parts are much improved, by a judicious system of liming. Here, as in most wastes, paring and burning is the first verse in the chapter of tillage. In fencing this waste, we observed hawthorn staggarads, or grown quicksets, planted on one side the road; and hand-sets (hawthorn) from the nurseries, on the opposite side of the road; in a few years afterwards, the latter were by far the best fence.

5. It is said that *New Forest* was formerly a part of the Duchy of Lancaster. The whole of the waste was about 350 acres; 250 of which was enclosed by common consent. The other 100 acres remained open in 1811, owing to a dispute about the boundary: it being in two fief lordships, Llantryddyd, and Llanisannwr. The former lordship is said to have been

been sold, or granted by Charles I. to Sir John Aubrey, of Llantryddyd Park, a person equally celebrated with the Vaughan of Golden Grove—of his time, for affording an asylum to persecuted loyalists during the triumph of democracy in the civil wars: the latter lordship was reserved in the Crown, to be granted by Charles II. to — Gwyn, Esq. of Llansannwr, whose descendant of the same name is now lord of the manor, patron of the living, and proprietor of the principal part of the parish.

New Forest is in the white limestone tract; on an eminence with Llansannwr marsh, a low tract in much want of improvement, lying between it and Penline Castle.

No tithe of grain was given out, or paid for, during the first seven years, from this enclosed tract, as well as some others; the cultivators claiming the benefit of the Act of second and third of Edward the 6th.

“This Act,” says Mr. Hassall, (Pembrokeshire, p. 43), “for promoting the cultivation of barren lands, by discharging them from the payment of tithes for the first seven years after the improvement, seems to want an explanation. It is very generally admitted, that the plain and obvious intention of the Act, was, to promote the improvement of such waste lands, as were in their own nature barren, and not capable of producing crops without some extraordinary expense of manuring. Under this construction of the Act, its benefits would extend to all our waste lands, which are every where poor and barren in their natural state. But by the opinion of some modern lawyers, recently taken upon cases of this sort, the Act aforesaid is explained in such a way as to afford no exemption to our wastes; and this is a most effectual bar to improvement;

ment; insomuch as it gives the tithe-owners too great an advantage."—*Mr. Hassall.*

Had the term *common waste land*, been substituted in the Act above alluded to, instead of *barren* land, it would have exempted such land from tithe during the term: but the Act, as it is, is in itself a nullity; as there is no land, or soil, excepting blowing sands, that can be termed absolutely *barren*. Every soil, where any kind of vegetation takes place, be it ever so poor, affords some food for hardy sheep, whose fleeces and lambs are titheable. To sell off the sheep from a waste, and convert it to tillage land, to be tithe-free for a term of years, without the concurrence of the incumbent or impropiator, seems to be a stretch of power, which nothing short of an Act of Parliament can sanction; and not even that, without violation of rights.

Mr. Hassall proceeds (p. 45): "In cultivating waste lands, it would be equitable to allow the tithe-owner as much during the first seven years, as the waste usually produced."

This is candid; but the best contrived regulations are liable to abuse. We knew an instance where this recommended regulation took place, in an Act for enclosing the waste lands of a manor estimated at 15,000 acres. No tithe of corn or hay was to be raised in kind during the first seven years, the term to commence from the period of allotting or trigging; and the Commissioners were to award a certain per acreage, to be paid half-yearly in lieu of tithes, so that the incumbents or impropiators should suffer no loss by the enclosure. To this the tithe-owners had consented, some willingly, and some reluctantly, by a written declaration, before the bill was presented to the House of Commons. So far, every thing appeared to be well

done; but mark the consequence. Neither the clergy nor laity profited much by the innovation. Some farmers, eager to get the greatest number of crops possible within the seven years, free of tithe as they considered it, continued a ruinous course of cropping: so that when the seven years were expired, the new enclosures, in many instances, were completely exhausted: and during that time, tillage was, in a great measure, transferred from the old enclosures subject to tithes, to the new enclosures, which were tithe-free; so that the tithe owners suffered loss in both kinds. And to make matters worse, though the Act had ordered the composition in lieu of tithes to be paid half-yearly, yet the Commissioners' award, specifying the sum to be paid for each allotment, did not appear till the seven years had nearly expired. By this time, some of the occupiers had failed, some had emigrated to America, and others to eternity; and their compositions, of course, could not be recovered. Others, though able to pay, finding the arrears amounting to a considerable sum, became refractory; and lawyers being consulted, gave their opinion that the compositions could not be then levied; as by the Act, they were to be paid half-yearly; and if any action lay, it ought to have been against the Commissioners for neglect, in not doing within the proper time, what they were enjoined by the Act.

To encourage judicious tillage in new enclosures of this kind, preferable to tithes in kind, which in certain cases must be grievous, as well as preferable to compositions, which are seldom equal, would be an adequate allotment of the waste to the tithe-owner, in perpetuity, to be fenced out at the general expense incurred under the Act: and if any commutation for tithes shall ever take place, is not the sale of the tithes, and the purchase

chase of land, to an equivalent amount, the most plausible scheme of any, if it can be rendered practicable; as the value of tithes, and of land from which tithes issue, must rise or fall in an equal degree?

Mr. Hassall forfeits his usual sagacity when he asserts, that "our waste lands are *every where* poor and *barren* in their natural state." We know he will not presume to defend this position. But to return from this digression.

6. *St. Clare's* is a Crown manor, in the shale tract, bordering on the northern verge of the red sandstone tract, which in the lower part of Caermarthenshire ranks among the more fertile soils. The allotments disposed of to defray the expenses of the Act, sold for about 60 guineas per acre; the highest price we heard of for such lands in the district. Land, of every description, does not fetch such a high price, in general, in the southern as it does in the northern part of the Principality. In North Wales, very ordinary waste land, in bleak situations, sells for from 20 to 40 guineas per acre; and so on, advancing, in proportion to quality and competition, to 60, and 100 guineas per acre: we know of one parcel advanced to 40*4l.* per acre.

7. Private property, intermixed and open, was exchanged, allotted, and enclosed, to the amount of about 10,000 acres, within the manors of *Penrhyn* and *Llanstephan*, under the powers of the Act, exclusive of the 1200 acres of common wastes inserted in the Table. The soil is excellent, in the red sandstone tract, bordering on the middle limestone.

8. *Llanelly*.—This is marsh land, within the borough hamlet, embanked and drained. By the Act, part of the enclosure was to be leased, and the rents thereof to be applied, under the management of trustees, in improving the town and port of *Llanelly*. It is in the coal tract, and near the deepest part of the mineral bason.

9—16. The numbers from 9 to 16, both inclusive, are in the shale tract; excepting part of No. 12, called *Mynydd Cerrigg*, in the parish of *Llanddarog*, which is in the red sandstone and middle limestone tracts.

17. *Mynydd Mawr*—i. e. the Great Mountain, within the lordship of *Kydwelli* and Duchy of *Lancaster*, is situate within the middle limestone and coal tracts; and in the several parishes of *Llandebie*, *Llanarthney*, *Llanvihangel*, *Aber Bythych*, and *Llan Non*: the portions of it estimated to appertain to each parish, as under—

<i>Llandebie</i> ,	£000 acres.
<i>Llanarthney</i> ,	1500
<i>Llanvihangel</i> ,	1200
<i>Llan Non</i> ,	380
	<hr/>
	5080 acres.
	<hr/>

The first Act for this enclosure passed in 1811; to defray the expenses of which, 300 acres were sold in lots of from 23 to 30 acres each. The following year another Act became necessary, to amend and explain the former Act, and to empower the sale of 300 acres more, towards forming a new road over this mountain.

The

The last 300 acres were sold in lots of from 9 to 30 acres each.

18. *Catheiniog* enclosure is within the hundred of that name; and is so called from St. Cathen, the patron saint of a church within the hundred; *q. d.* the patrimony of St. Cathen. The wastes enclosed under the Act, are those of Llanfynydd, Llanegwad, Llangathen, and Llanvihangel cil Vargen; being contiguous parishes, on the north-west side of the Towy, in the shale tract. The lots sold to defray expenses were extremely minute: 61 acres being divided into 46 lots, and 37 acres into 45 lots.

19. *Llan Vihangel Rhos y Corn*, and *Llan y Byddar*.—These are also in the hundred of Cathemniog, but more elevated, in the range of shale mountains which runs south-westernly between the Vales of Towy and Teivy. The lots sold were, some of them, upwards of 50 acres each; which, considering that one-third of the purchase money was to be deposited on the day of sale, and the remainder to be paid within two calendar months, must considerably reduce the number of bidders, and consequently the amount of the purchase money.

20. Under the Act, No. 8, only 400 acres of marsh land, in the borough hamlet of Llanelly, were enclosed. The remaining wastes of the parish of Llanelly, together with those of the adjoining parishes of Llan Gennech and Llan Edy, are to be enclosed under this Act: all within the coal tract.

“ Wastes, mostly marsh land, on the Burry River,

“ 3

from

WASTES.

Machynys Point to Pont ar Ddulas, are no less 10,000 acres; of which about 2000 belong to Llanelli.

The hilly wastes in the hundred of Kydweli, amount to 10,000 acres, whereof upwards of 5000 acres are in Llanelli parish."—*Rev. Mr. Evans.*

Haminiog:—In the ancient division of Wales, was called the comot *Anhunog*. Its proper name was *Haminiog*, bordering upon, abutting, &c. It is a large manor, and situate north of the Aeron, in the same tract. The enclosure includes the waste of several parishes of Llan Badarn Trev Eglwys, Llanystyd, Llansantffrêd, and Kil Kennin.

Llan Vihangel Genau'r Glyn:—This lordship includes *Cors Vochno*, the extensive fen, already described in treating of the wastes of Cardiganshire. Several other enclosures may have taken place, and

		<i>Acres of Waste.</i>
From the year 1763 to 1780, there were enclosed by legal authority, within the six counties only,	}	600
From 1780 to 1790,		1826
Ditto 1790 to 1800,		274
Ditto 1800 to 1810,		8730
In four years, from 1810 to 1813, both inclusive, either enclosed or enclosing, no less than	}	50,000
		<hr/> 61,430
In North Wales, within nearly the same period, no less than	}	100,000
		<hr/> 161,430

The following additional enclosures are, or lately were, in contemplation ; and some of them may have had Acts procured in the last Session.

In Brecknockshire :

1. *Drum Mountain*, in the lordship of the Great Forest, containing by admeasurement 41,324 acres, of wastes, belonging to the Crown : in the red sandstone, middle limestone, and coal tracts.

2. Lordship of *Aber Esgair*, in the red soil tract.

3. *Llan Sant Ffred* (St. Bride's)—*Llan Veilo*—*Llan Veigan*—*Llan Vrynach*—*Llan Ddetty*—and *Vaenor* ; on both sides the *Usk*, in the red sandstone and middle limestone tracts.

4. *Llan Ddew*—within the manors of *Alexanderston* and *Mara Mota* ; in the red sandstone tract.

WASTES.

employed for the interests of their country, than in the various manufactures now fallen so much away. What a noble source of industry would lands afford to this worthy class of men! But it is, by those who are unfavourable to the measure, that it would be impossible to find sufficient dressings for the lands so enclosed;" but certainly this is by no means the fact: and the belief of a conclusion so false might with infinite injury.

When it is considered that lands that have never been in a state of cultivation, have their stamina unimpaired; and that we frequently see land so enclosed and so improved, as to bear several crops without a particle of manure, surely we ought not to damp the ardour of those who are in favour of the Bill, by urging arguments so fallacious. But we know, that independent of manure (dung) which may every year be collected by the industrious husbandman, there are scattered all over the kingdom, vast quantities of lime, of limestone, as well as the fertilising

With the main points argued in the foregoing discussion by *D.*, all well-wishers to a General Enclosure Bill will readily concur: it has however some exceptions, to which they may not so readily assent, viz. that "waste lands so enclosed and broke up, bear several crops, without a particle of manure." This may have happened in some extraordinary cases: but comparatively they must be very few, and of small extent. That the ingenious mechanics, also, now out of employ, might be beneficially and usefully employed in the cultivation of "waste lands," admits of a very rational doubt. *Ne sutor ultra crepidam*, like other proverbs, has its foundation in stubborn truth. How could these ingenious mechanics be transferred from their homes and their families, in Sheffield or Birmingham, to the distant and scattered wastes? And even when transferred, or it may be said, transported—how could they be employed "beneficially and usefully?" With hoes in their hands like negroes?—They have never been accustomed to hold a plough, to drive a team, or to form field fences. The most useful accession of hands to cultivate our waste lands would be as many as have been brought up in the occupations of husbandry, now in our armies abroad, or in the militia at home; as many as will return with health and limbs, at the restoration of peace; and may we be permitted to hope, if not to predict, that the period is not very distant: then, as soon as the preliminaries of peace are signed, may the *General Enclosure Bill* be again presented; and may every county in the United Kingdom, without one exception, petition for its success. "*Trech gwlad nae Arglwydd*, is a Welsh proverb, and must be a true one, under every free government.

"Justices

WASTES.

Justices at Quarter Sessions to empower the Disposal and Enclosure of Wastes.—A General Enclosure Act, it is believed, includes the wishes of all Agricultural Societies, and all improvers of land, in Britain. The great trouble, and sometimes enormous expense, attending the present mode of applying to Parliament for Enclosure and Draining Bills, is known to be a very great hindrance to the improvement of Waste Lands. People of small fortune dread the expense of these applications so much, that they will rather permit their best waste lands to lie dormant, than subject themselves to the greater inconvenience of an expense they are not always able to bear. To remove this difficulty, would perhaps be one of the most popular and beneficial undertakings in which the Honourable Board of Agriculture could engage. The opinion of some of the most intelligent persons I have talked with on the subject is, that an Act should be applied for, to empower the Lord Lieutenant of each county, with the

poses at present obtained by separate Acts. It is generally believed in this country, that such a General Act would be the means of enclosing every acre of waste land in South Wales, capable of cultivation, within a very few years."

"The Commissioners might also be empowered to make regulations for depasturing so much of the wastes as may be deemed unfit for cultivation, as they should see fit and proper. The turf upon many of the wastes being a kind of public stock, for which the inhabitants of the neighbourhood pay the lord of the manor an acknowledgment for the privilege of digging fuel, it may be proper to let all peat bogs remain unenclosed, and subject to such regulations as may be devised for their future management. Common fields, and all intermixed lands, might be exchanged, divided, and enclosed under similar authority."—*Mr. Hassall, in Original Reports of Pembrokeshire and Caermarthenshire.*

May we be permitted to add a few lines, on elevated sheep-walks, "*unfit for cultivation.*"

Separate Acts for single manors, is the greatest facility for the progress of enclosures; afforded by the present system. The motives for this tardy and expensive mode, are supposed to be no other than the fees and perquisites of men in office. Manors are of very various sizes; some co-extensive with a parish or hamlet; others reaching over several parishes; sometimes nine or ten. In a country like Wales, mountains obtrude themselves in every direction. A part of the manor may abound with *cultivable wastes*; whilst the other extremity abounds with mountains scaling the skies; where a stern long winter forbids the return of seed to the sower. However, in some cases, the whole
of

of the manor is to be divided and enclosed : the freeholders of the parish or hamlet frequently enveloped in clouds, or electrified with storms, have not the foresight to get their mountain sheep-walks exempted from the general operations of the Act ; and it can scarcely be expected that the professional men who bring forward the enclosure, and whose interest therein is distinct from any future profits, will take the trouble to foresee for them. The division of the uncultivable mountains takes place, *volens volens* ; and considerable portions of the best parts of them must be sold to defray expenses. The lots may be sold to bidders from other parishes or hamlets, and the hereditary sheep-walks must therefore be curtailed ; so that fewer sheep can be summered by the inhabitants of the parish or hamlet than theretofore. Boundaries of property, it is true, will be accurately ascertained ; but as sheep-walks, belonging to certain farms, cannot always be fixed in the same place, a confusion frequently ensues : shepherds must be employed to keep sheep in new and strange walks : those accustomed to southern aspects, on dry soils, will be driven to wet moors on the north, and *vice versa*. Brutes acquire habits ; and the flocks will not desist from attempting to regain their former walks, until they fret, and contract diseases, by being continually harassed ; and the farmers in consequence suffer loss in wool, lambs, and a portion of the breeding stock.

Commissioners, lawyers, and surveyors, should have nothing more to do with *uncultivable mountain wastes*, than merely to ascertain the boundaries of manors, parishes, and hamlets, whose interests are detached.

Let not the foregoing reflections be construed as
hostile

hostile to the division and enclosure of *cultivable wastes*; where the plough can work, manure be procured, and *some* prospect can be entertained of profit by tillage.

Advantages and Disadvantages.

"The *advantages* attending general enclosures are many; and preponderate against the disadvantages:

1. "They identify the occupier's property, and encourage him to improve it.

2. "Wastes, when improved, will produce more than four-fold what they do at present, which is of vast importance to an increasing population.

3. "General enclosures induce tenants to be industrious, and make the most of the land.

4. "The increase of the rent-roll of the proprietor of the land to whom allotments are made.

5. "They take away from poor people a precarious independence, which renders them disinclined to be industrious."

(N. B. In a parish in the county of ***, where there are estimated to be 15,000 acres of waste land, the number of illegitimate children born some years, exceeds those of lawful wedlock).

6. "The enclosing and cultivating the wastes would afford poor people means to gain money; and so would make them industrious, and render them comfortable.

"The *disadvantages* attending general enclosures are more specious than real: they are stated to be,

1. "That they will deprive industrious farmers of the lands they have enclosed and cultivated.

2. "That

2. "That poor people, being deprived of their little flocks, will be reduced to beggary.

3. "The poor people will be starved, as at present, in the greater part of the slate and shale tract; the surface turf of the wastes is all they have for fuel.

4. "That fewer sheep will be reared; and, in consequence, the woollen manufactures will be injured."

To the *first* argument it is answered, that Acts of Enclosure commonly provide for the disposal of such encroachments:

1. "If the encroachment be of twenty years standing, or upwards, before the passing of the Act, without rent or amercement being paid, or attornment made, to the lord of the manor; that the encroachment shall be deemed absolute freehold.

2. "If the encroachment be of twenty years standing, or upwards, and rents or amercements had been paid, &c. to the lord; that then such encroachment is to be deemed the property of the lord.

3. All encroachments within the space of twenty years, are to be deemed parts and parcels of the commons and waste lands; but to be allotted to the farm to which it had been attached, according to its improved value, in part or in full compensation in lieu of common rights; and if the encroachment be more than an adequate share, then only a competent part of it: and if the encroachment be more convenient to another farm than that to which had belonged, then the Commissioner to act discretionally.

"To the *second* objection, it may be answered, that poor people who have exerted themselves to enclose, may have some portion, according to the labour and expense they have bestowed.

"To

"To the *third*, that the surface sod is the most perishable of fuel, and scarcely worth cutting; that the practice is ruinous to the wastes; and that the townships ought to make passable roads to the regular peat pits, where no other fuel is procurable, and assist the poor to haul their fuel home, as is done in other places.

"And to the *last*, that though the wastes be enclosed, there will be no necessity for the occupiers to convert the same altogether into arable; but by having hedges and plantations, means will be afforded for increasing the number of sheep, as they will be supplied with a greater quantity of herbage, and shelter will be afforded them in winter."—*T. F. L.*

Improvement of Enclosed Wastes.

Shale, or Slate Tract.—The more lowland commons, and hills of an easy slope and moderate height, consist of two kinds of soil:

1. A dry ferny soil, or hazel mould, semi-dense, easily tilled.

2. A wetish surface, upon varieties of clay; producing carexes, rushes, heath, moss, the procumbent furze, &c.

In some places, the *former* is fallowed: after two ploughings and harrowings, the un-reduced sods are collected and burned; lime, being in readiness, is then spread upon the ashes; and rye or meslin is sown under the furrow.

The *latter* soil, owing to the tediousness of reducing it by fallow, is more frequently pared and burned, sometimes with, and other times without the addition of lime; and sown under the furrow, with rye most commonly.

In some places, both kinds of soil are pared and
 1. WALES. VOL. II.] 1 burned,

burned, fallows being little thought of at first breaking up.

In ferny soils, July is the most effectual season for attacking the fern roots by fallowing; when they are in full sap, exposure to the sun, and liming, have the greater effect.

In paring and burning such soils, lime, where procurable, should be added to the ashes. The first crop of rye is not always visibly improved by the lime, but the second crop of oats is generally doubled in value. Lime is better bestowed with the ashes for the rye crop, than afterwards for the oats. At a distance from the kilns, and along bad roads, lime is easier procured during the summer for rye, than early in spring for oats; and moreover, by the second tilth for oats, it is become more intimately incorporated with the soil; and will have gone a good way in the reduction of fern roots.

In the first crop of rye, fern are seldom weeded, as the rye will be far grown before the fern appear; and that year, from being cut by paring the preceding summer, and overshadowed by the rye the following one, their growth will be but puny: but if the rye crop be not limed, they will have attained renewed vigour in the crop of oats; as on their first appearance, the oats will be too short to arrest their progress. The best method of weeding them in the crop of oats, is by cutting them below the branching knot, and above the tops of the oats, if practicable, with reaping-hooks, &c. Cutting them separately, in the common method, will be found tedious.

A common practice is to fallow for the third crop, and lay down in grass, which still farther reduce the fern roots. They are not, however, easily subdued; fallow

fallow as you will, they will stand another campaign, or two more generally : even after paring and burning, a crop of rye, liming, oats, fallow, turnips, barley, clover, hay, they will still appear a fresh crop, when the aftermath of clover is depastured. It will require another rotation to subdue them ; and if they appear a second time, cutting them young, nearly as soon as they have branched, and that repeatedly, will gradually effect their final disappearance.

Modern farming condemns the cropping of pared and burned wastes with rye and oats : turnips, it says, should lead the course, to be eaten on the ground. It is certainly better, where the quantity of land is not too great, or at too inconvenient a distance from the requisite manure ; which in new enclosures is too frequently the case. *General rules of this kind*, picked up from books and hearsay, are beneath the farmer's notice. *Rye* is a very profitable crop, where wheat would scarcely return the seed. We have heard farmers, of much experience, assert, that they never had so much profit from wheat crops on lowland gravelly loams, well managed, as they had from rye crops on fresh wastes of some elevation.

Sometimes, when the rye stubble is ploughed for oats in the spring, the soil will be too light, being kept up by the unrotted stubble beneath ; and a scanty crop is the consequence. The remedies are, low reaping, where fern, &c. do not prevent ; burning, cutting, or drawing the stubble ; or, if the soil be not very light, fallow early in winter, to rot the stubble ; and plough it again in spring, or sow oats on the stale autumn furrow, especially where the soil tends to clay.

The occupiers of newly-enclosed wastes, however,

WASTES.

not lose sight of turnip crops, as often, and to tent, as the quantity of manure to be afforded, allow; especially before laying down in clover the last crop of every course. Ferny soils of wastes seldom disappoint the farmer of a crop of turnips, especially if he has his manure fresh from its stable bed. Such turnip crops are generally very free from weeds: fern being commonly the only weeds: which are drawn up by the roots, as soon as the turnips are formed, in preference to the chopping of weeds with hoes.

Shale Tract.—These wastes, though similar in several respects to the shale and slate tract, are, nevertheless, in general, more improveable. Commonly, lime is more and cheaper procured. The soil, where wet, is more drained: the clay having frequently more been incorporated with it, is easier reduced by tillage.

CHAP. XII.

IMPROVEMENTS.

THE greater proprietors, formerly, contented themselves with improving only the demesnes in their own occupation ; and adorning the vicinity of their mansions, in the reigning taste of the day, whether in planting, or in rooting up that which had been planted. Now, the genius of agriculture inspires the resident nobility and gentry with a taste for general improvement, in which their tenantry are gradually instructed by example, which is far more efficacious than precept.

Do you find Wales improved since you saw it last ?
 “ Every part of it is improving, excepting Dinas Mawddwy.”—*D. J.*

“ Although an intelligent agriculturist of the present day, must view the state of agriculture in South Wales with an eye of regret, for its evident backwardness, when contrasted with the superior improvement of many other districts of the kingdom ; yet, the progress of improvement has been steady and uniform for the last thirty years ; at which period the spirited example of several intelligent gentlemen of landed property, in various parts of the district, began to be understood and practised by their neighbours. Immense tracts of uncultivated private property have been brought into a productive state : great attention has been paid to the improvement of farming stock of every kind : our, bullocks, cows, horses, sheep, and hogs, are highly im-
 1 3 proved

DRAINING.

ved in their forms, as well as in their fitness for the purposes to which they are applied. Attention to dress in ploughing, and cleaning the soil; and the appearance in a destructive multiplication of successive corn crops (so much complained of heretofore) is visible every where, and is still gaining ground. Improved implements of agriculture have been generally introduced, and the use of them is increasing. A bill for enclosing waste commons is become very general; and the planting of forest trees is greatly increased in the district."—*Tenby, June 10, 1813.*—*Hassall.*

SECT. I.—DRAINING.

THIS is an improvement grown very much into vogue within the last twenty years. It need not be said that its intention is to render wet soils drier.

of an uniform surface and wetness, by covered drains, is far more specious than real. Thousands of pounds have been expended in this ideal improvement, which would have better been laid out in deepening the pervable surface, broad ridging, liming, and otherwise manuring, open furrowing, &c.

Mr. Clark, in Radnorshire, p. 11, writes very appropriately on this subject: "The soil, towards the middle of the county, is, in many parts of a weak spungy clay. Water is peculiarly hurtful to this species of soil; with which, from its retentive nature, it parts with great reluctance. Another misfortune attending this soil is, that it keeps possession of that portion of water which it catches first hold of, to the exclusion of the air, and of other richer moisture contained in the atmosphere, the grand store-house of nature.

"In order therefore to render this soil more productive, the violent attachment to its mortal enemy, water, ought to be subdued. This can be accomplished *only* by deep and repeated ploughings; which, by separating the parts, opens a number of passages for the entrance of the sun's genial warmth, to dry up that obnoxious moisture, which, in its present state, proves so hurtful to all useful vegetables."

The country is now filling with professed drainers; and if they know better, it would be against their interest not to recommend the draining of all kinds of wet surfaced soils indiscriminately. They are too frequently let upon a farm to plan out their own work; and if the soil be easily cut, they are never niggard in their number of roods. One hundred roods (of eight yards) an acre is not uncommon; and that upon land without a single spring within it. One gentleman, who had ex-

pended 12*l.* an acre in cutting, raising and carting the stones, and filling; without any visible improvement in the soil by the mere draining, candidly owned that he might as well have thrown his 60*l.* into the river. The clayey surface retained only the rain and snow-water before draining; it retained it in an equal degree after draining. Some other more effectual means must be used to render the surface more porous, or pervable to rain, sun, and air.

Such clayey tracts are common under dry rising grounds: the rain-water percolates through the soil of the rising grounds until it meets with a stratum of clay, rammel, or rock; along the surface of which it oozes, until it appears upon the clay at the foot of the rising ground; and may be called by some drainers a *spring*, though essentially differing from it in every circumstance; but more especially, 1. it extends laterally to a greater distance; 2. it ceases to issue after a few days of dry weather.

If the boundary of the hazel mould, &c. of the rising ground and the clayey tract below, be in a straight line, the foss of a fence in the same direction may carry away the water; but if the boundary line meanders, a covered drain may be of greater service here than *twenty* parallel drains farther below in the clayey tract. However, if drains must be cut below, let the stones in them be covered with gravel, or other porous materials, to the very surface: otherwise, if the clay dug from the bottom be thrown from four to six inches deep upon the stones, it will soon effectually resist the percolation of the surface water, the only water we are concerned with in treating of this branch of draining.

Every

Every farmer should be himself a drainer; and then the men of the profession, who think themselves equal to Elkington, will not presume to impose upon him.

"In cold clayey soils, trench drains will answer the purpose very imperfectly. The rain-water soaks into the thin surface, and is there retained by a substratum of clay from eight to nine or more inches deep, through which the water will never pass by filtration into any underground drains that can be thought of. The best remedy for such wet and flat tracts is "*broad ridging*," such as is practised in many parts of England, and particularly in the Vale of Evesham. The ridges to be twenty or thirty feet wide, more or less, according to circumstances. The water will then have a quick passage from the crown of the ridge to the rines or furrows on each side. This broad ridging, it must be confessed, gives an unsightly appearance to the land; but rushes, lodging water, and sterility, are still more unsightly."

—E. W.

No *improved* land, viewed by an Agriculturist, will be deemed *unsightly*. We were gratified in seeing wet tracts of this kind, improved by broad ridging, on Llaugharne Marsh; near Gelli Gaer, in the Glamorganshire coal tract; and, more especially so, on the Rev. Dr. Hunt's farm, on a reclaimed portion of Margam Marsh. One piece was under the first year's clover and grass-seeds: part of the piece had a clayey, the other a peaty surface: the latter had the best clover: both had the seeds sown on a wheat crop the 24th of April, bush-harrowed, and rolled. The latter operation may have effected the difference in the crop of clover; by rendering more firm the porous peaty soil, and by making the clayey part too dense. Dr. Hunt had another marshy piece pared, burned, and sown with
wheat

wheat and white clover in October, as an experiment whether the clover would insure a footing before the induration of the clayey soil would take place in the dryness of the following spring. Both fields were broad ridged as uniformly as if prepared for Boswell's method of floating: and, indeed, where streams of good water lie convenient, these draining broad ridges, when laid down for good, might be floated to advantage, to save composts or other surface dressings. We need not mention the different effect of floating water and lodging water upon soils of this description; the former warms and fertilizes, the latter chills and sterilizes the soil.

Even the clayey tracts are in many places interspersed with swamps, or spring-bogs: here is the proper province of *draining*, for there is no other remedy: and it is done effectually, in numerous instances, in every county of the district.

Clasement demesne, is in the Glamorganshire coal tract; a great part of it consisting of a thin soil upon a substratum of yellow clay, with frequent issues from beneath. Sir John Morris had, some years ago, drained upwards of 500 acres; the drains generally filled with stones; the exceptions being peaty swamps which required to be filled with green faggots of wood. Several parts of his estate have been rendered about six times their former value by draining.

“ My master has a particular antipathy against *carnation grass* (carexes of several varieties) and wherever he finds it upon his land, he immediately orders his *drainers* to work; so that in a short time it will be entirely expelled from its old domain.”—*Bailiff*.

We have seen *carnation* or *pink grass*, growing abundantly upon an ebb soil on the lias limestone on the Glamorganshire coast, about Dunraven, &c.;
from

from whence it could scarcely be expelled by *draining*. This thin soil is dense; retains rain-water on its surface, which chills the roots of most of the finer grasses; and at the same time cherishes the growth of this useless weed. Here, judicious tillage and manuring should be the expellers of pink grass: draining has nothing to do. A good fallow for *turnips*, well limed and dunged, followed by a corn crop with *sainfoin*, would be the cure of this land, and render it ten times, yea twenty times, its present value.

“Pink grass is the production of soils envenomed with acidity, with which the coal tract abounds. The plant itself contains an acid, destructive to sheep, and more so in autumn than spring.”—*Llanelly*.

On the means of checking the growth of pink grass, by surface dressings, on sour and elevated soils, see forward, in the Section on *Manuring*.

Peaty Soils.—“There are numerous tracts of a moory or peaty nature, that only require *draining*, to be converted into soils of good fertility. Much has been said of reclaimed bog or peat, and of its boasted superlative fertility: but without the addition of considerable quantities of argillaceous earth, with other earths, to render it more compact or firm, it will hardly come up to what it has by some been represented. Very often a substratum of clay may be found under the peat, which easily falls or separates in water, and contains in it a considerable portion of fine siliceous or sandy earth, especially in the coal tract; this clay, if ploughed, or otherwise brought up, and properly mixed with the light peaty surface, after *draining*, would give consistence and firmness to the soil. Where the plough can reach it, some of it might be brought up every year; and

DRAINING.

The addition of some lime, or even coal or peat, would accelerate the opening of the clay, would convert vegetable substances into good manure, decompose the bog or peat, into pure carbonic earth; and, in such operations, assist greatly in bringing the soil into a state of superior fertility. Without such additional aids, moor, peat, or bog, will hardly, I fear, be converted into good, sound, and fertile soil; though the contrary has been asserted too often; and many, who have given full credit to such assertions, have, with high expectations, set about the work of *draining*; but have not tolerably accomplished that end, have, after expending themselves considerably, though not entirely, disappointed. Many soils of this kind, however, are composed of peat, especially in the coal tract; but mixed with a mixture of argillaceous or loamy earth; these, once drained well, will soon become more or less sound, in proportion to the quantity of such loamy matter contained in them; and where the quantity is deficient,

should never be burned till red : but this is not a deficiency of peaty soils ; they want substances that will give them firmness, and render them less spungy."—*E. W.*

Several hollows, especially on the coal tract, are favourably situate for the reception of foreign admixtures, argill and silex, conveyed and deposited on peat moors by stagnant land floods : this renders the peat less useful for fuel, but more valuable for tillage ; of this kind we consider the flat turbary near near Amroth House, in the Pembrokeshire coal tract. Of late years, a tenant held this turbary of 38 acres dear at only 4*l.* 10*s.* a year. The surface was peat, about 10 inches deep, upon a substratum of friable clay ; covered by water in wet seasons, and the grasses consequently of the coarsest kind. When the estate was purchased by J. Ackland, Esq. the first operation was *draining* ; then paring and burning, and lime mixed with the ashes. Then a course of cropping—1. Turnips ; 2. Wheat ; 3. Barley ; 4. Oats, with red clover and rye grass. During the course, the crops gradually improved with the progress of tillage. The spot lying low, on Caermarthen Bay, the first and immense crop of hay was mown so early as the 10th of May ; and in about six weeks, a second crop, above ordinary, though not much above half the former crop, was cut : and Capt. Ackland seemed convinced, that if no grass seeds had been sown with the last crop, the first year's produce of natural hay would have been abundant.

When J. Goodrich, Esq. purchased the Geneu'r Glyn estate, near Caerphili, in the Glamorganshire coal tract, about twenty years ago, much of the demesne were *peaty moors*, producing heath, reeds, rushes, bents, &c. His practice in *draining* was to cut

cut through the bed of peat, whatever might be its depth, from three to nine feet, into the substratum, whether of clay or of gravel. This gave an undulation to the base of the drains, but no obstruction to the draining, save a considerably more labour; as the water finding its level in the reservoirs, flowed off.

Some writers on *draining*, recommend the cutting of drains "through the clay, so deep as to reach the water stratum." This advice requires an explanation. The water stratum alluded to, must be *over*, and not *under* water-tight clay. Drainers in general content themselves with cutting three or four inches into solid clay, which is known to be water-tight, by being perfectly dry in cutting, whilst the water is seen oozing above it, from the upper side.

"About Aber Dâr, and other hilly situations in the coal tract, when peat-lands are *drained*, the surface is pared and burned; lime added to the ashes and spread. Then barley, oats, turnips, or clover, have been sown, and bush-harrowed, without ploughing. Good crops have been thus obtained. Plough the second year; dress with sound soil, if obtainable; lime, &c.; and proceed with varieties of crops for two or three rounds; the *peat* every year improving its staple: then lay down in grass. Coal ashes are here procurable in good quantities to top-dress the sward."—*E. W.*

Mr. Johnes of Hafod, has had great experience in the *draining* and management of peat soils: 1st, *Drain*, then pare and burn, then a covering of from four to six inches of common soil, then dig it over from six to eight inches deep; mixing soil, ashes, and peat, in the operation; then sow rape to be fed off with sheep; and lastly Yorkshire hay-seed (*holcus lanatus*) and lay down."

"On

"On this soil, after a crop of oats, flax has succeeded uncommonly well."—*E. W.*

Mr. Johnes's latest operation is upon an open sterile tract of 700 acres, including the recent plantations of larch, &c. on the north and east, on the rising grounds; the inner area consisting of some parts peat, some clay, and some sound hazel mould at the base of the declivities. The whole forms a compact amphitheatre, in the bosom of a circular range of grassy hills; and is open only to the southern point, the valley of the Ystwyth, and the pleasure-grounds of Hafod below. The situation is on the right of the turnpike-road leading from Rhaiadr to Aberystwyth. In coming from the celebrated cascades of the Monach, below the Devil's-bridge, we enter this new creation, as it were, under an arched gateway, lately erected, but designedly bearing the features of rude antiquity; and bestriding the road like a Colossus. Immediately on passing under it, we found ourselves encircled in plantations of larches on all sides: on the left a snug cottage, on elevated ground, in view of the whole amphitheatre below. At some distance, another comfortable cottage presented itself on the right of the road, commanding some views not so attainable from the first cottage. These cottages, inhabited by useful dependants, were, no doubt, thus arranged, as guardians of the surrounding plantations. Nearly in the centre of the 700 acres, stand the *new farm* house, yards, and buildings, occupied by the managing bailiff. The whole tract is divided and fenced into sizeable fields, and intersected by convenient roads.

We have already hinted, that lowland moors of peaty soils, owe their fertility, under cultivation, more to the ingress and acquisition of alluvion, brought by
floods,

DRAINING.

ds, than to any thing inherent in the quality of the peat. Mr. Johnes seems to be of the same opinion: peat-lands are not capable of being fertilized by natural alluvion: therefore on this tract, he goes to the sense of cutting a spit deep, of ten or twelve inches on the surface; to be dried and burned in sod-kilns, scattered on the spot; the ashes to be expended on the hard of the moory lands already prepared to receive them. In some parts of Wales, a measure called *rhaw*, being 240 square yards of peat, 18 inches deep, cut into brick shapes for fuel, for 10s. Reducing the depth cut over Mr. Johnes's moors to nine inches, the *rhaw* measure will be 480 square yards; which is equal to about 5 $\frac{1}{2}$ an acre for cutting only. When the surface of peat is cleared off for the kilns, draining is performed, then fallowing, liming, and dunging, for potatoes, &c.; then grass-seeds, and plantations of trees: of the latter were 16 acres in June 1813. In

the magic of cultivation and taste, to convert it entirely into "fairy land."

As this Section has already been spun to a considerable length, we have to apologize to *drainers* in general, for not noticing what may be deemed peculiar in *their* respective modes of practice. We have only to say, that *draining* is by many considered as an *art* of greater *science* than it really is. A few years more experience will convince every farmer of the truth of this position.

Since the introduction of modern draining tools, of narrow dimensions, the expense of cutting and filling is much lessened; excepting in main-drains which require the discharge of a body of water.

The chief materials for filling, are stones, such as the vicinity affords. The red sandstone and coal tracts abound with quarries of schistose stones, mostly micaeous; and very useful for forming pipes, of various constructions. Where flat stones are not procurable, pretty large rounded nodules are fixed with the hand in the bottom; and the smaller pebbles are thrown promiscuously over them, to within from four to six inches of the surface.

Some say, that drains well made, and filled properly with stones, will last to operate well from *twenty* to *thirty years*; whilst others insist, that they will last *for ever*. Some period between these, may be nearer the point of duration.

Where stones are scarce, some use *green* brushwood, alder truncheons laid crosswise in the bottom, surmounted with faggots, &c. &c.

One manager of a large estate in the Glamorganshire coal tract, having probably no stones in his own country to fill drains, still persisted in his *wood and sod* system in the native land of stones, where they are fre-

DRAINING.

ntly an incumbrance to tillage. Perhaps a Dutch-
would carry stones from the field into the road, and
er his shouldered drains with inverted sods.

flat lands on the margins of rivers, where their sinu-
course augments the evil, by rendering the fall still
are in many places in a very unprofitable state,
ng to stagnant waters in wet seasons.

Mr. Hart Davis has already begun to straiten the
rse of the Dulas, which flows east of Llan-Bedr
the Teivy. Much flat, and naturally good land,
ng to the meandering course of this stream, is kept
a comparatively unproductive state. A straight
rse must accelerate the fall, and assist the draining;
ch, when finished, will materially assist in convert-
the present rushy land into more profitable mea-
s.

arts of the margins of many rivers, such as the
vy, Teivy, Gwain, Avan, Ogmore, Dawon, Elai,
nney, &c. are in this condition. We shall notice

lowest point possible in the river; so that the fall of half the breadth of the enclosure would thereby be gained. Fences might be planted on the margin of each drain; plats made over them where necessary; intermediate drains into the main-drains—a canal on the land side, dividing the rising ground from the marsh; and other contrivances, which would readily occur to the Commissioner on the spot.

The increase of the practice of draining in general, may be collected from the transactions of the Cardigan-shire Agricultural Society.

In *four* years (from 1802 to 1805) the number of roods drained, for which premiums were claimed, and given, amounted to 1477 roods, of 8 yards each.

In the *two* last years (1811 and 1812) the number claimed for, exceeded those of the *four* previous years, being 1493 roods.

The most common rood or perch, in *draining*, is that of eight yards, or 24 feet; and in some places seven yards: the average price is 6*d.* per rood for cutting, and 2*d.* for filling.

“ If wet grass-land be well drained, the converting into tillage, recommended by Mr. Clarke, is unnecessary; unless it should be wanted: let it be mown for three or four years, and the grass will become fine. Drains, to be effective, should, in some soils, not be more than two yards apart. Poverty often makes bad farmers; as, when persons are poor, they are obliged to farm, not according to their judgment, but ability.”
—*Note on Clark's Radnorshire*, p. 11.

We are the more pleased with this note, as we believe it to have come from a landlord of very considerable property: and we agree with the doctrine it contains, if by *wet land*, be meant that which is not over

PARING AND BURNING.

ive of surface water, but rather a strong loam, or
l any other species of soil, injured by numerous
eal springs.



SECT. II.—PARING AND BURNING *.

is is an ancient practice, but how ancient in
s, we cannot decide. The laws reorganized by
el the Good, about the middle of the tenth century,
h they contain clauses regulating several opera-
n husbandry, yet, by a cursory perusal, we could
nd any allusions to this operation : neither do we
n the catalogue of implements, in the same code,
ny *paring* tools are included.

a Welsh treatise on Rural Economy, called *Cattia*
aeg, or the *Welsh Cato*, of which there are many
, in manuscript, extant in Wales, from three to
undred years old, and upwards, the practice of

“ cold wet soils, where lime was not convenient;” which shews that the author held the practice in no great estimation.

The practice however seems to be pretty common among the Dimetians of the three western counties, about the conclusion of the 16th century, when the Lord of Kemnaes wrote his history of Pembrokeshire. The author, after enumerating “ the natural helps and amendements for bettering the lande, as lyme, two kindes of marle, sande, and woe of the sea,” proceeds to the operation of *paring and burning*, thus—

“ They use alsoe in this countrey much *betling* and *burning* the land, wherein they sow most commonly rye, and sometimes barley; which kinde of tillage is alsoe in two sortes, either *clene bet-land* or *picd bet-land*. The *clene bet-land* is dug up with the bottax *clene*, leaving no parte of the turfe uncutt; and in this they sow rye, and sometimes wheat, as it requireth. This they doe in May, June, and Julye; and letting it lye with the grasse side downward till it become dry by sun and winde, and fitte and apt to take fire: then they pile them in heapes and give it fire on the winde side till it consume into ashes, which they spread in October and November, when they sowe their rye; which is sayed to be a great impairinge of the ground: for after the rye and one bad crop of otes, no corn is to be had thereof for 20 or 24 yeares after, and for a yeare or two scarce any pasture. In the most mountenous parte of this shire, which is nothings but heathe and small furse, and shallow withal, this kind of ill husbandrie may be borne; but husbandmen who use this kind of *betling* in land which otherwise would have been tilled to better advantage, are much to be blamed for doing themselves, the land, and the countrey harm.

PARING AND BURNING.

The *pied bet-land* is that which is but halfe digged in the bottax, leaving halfe the turfe whole and un-
e, which is burned as before is sayd; and in March
heapes of ashes being spread abroad, the husband-
sowes his corne, which it beareth to great profit;
pied bet-land is found to endure longer in strength,
to yeald more than the other clene betted land; for
will continue to beare otes well five or six yeares;
reas the other hath spent all his strength in two
es.

Some landlordes having store of this barren land,
ad it more commodious to keepe it in their owne
ds, than to rent it out at twelve pence an acre, which
e usuall rent thereof; for in twenty yeares he hath
twenty shillings; whereas if he kept it voyd, and
venty yeares end till the same, most commonly the
will yeald him 4*l. de claro* above all charges the
yeare, besides the pasture of the ground, all that

pared, that the grass roots might well survive the kind of one tilth annually bestowed for five or six successive years. This soil was much superior to the other, and accounts satisfactorily for the superiority of crops, and better herbage growing naturally at the conclusion of the course.

Both these modes of *batting* are still in use in the Dimetian tillage; and the reasons still given for the different practices, are those we have above stated. The reason for totally destroying a coarse herbage, by combustion, is rational: it is the speediest, and perhaps the cheapest method of reducing a coarse soil, into a state fit to receive manure. After burning for a crop of rye, the soil is in a fitter state for turnips than it could possibly be by any kind of fallowing, which, on these kind of soils, is a very tedious process, and after all, frequently imperfect: but that burning should be partially adopted, on soils bearing a finer herbage, admits of no apology, save that it is the most convenient mode of manuring in particular situations.

The "pied batting" (*ceibio brith*) is getting less and less fashionable; and may its complete extinction be speedily reported. In performing it, a round sod is pared by a hoe-mattock, from the centre of a square, and the four angles remain uncut.

"Laced or striped paring, is sometimes practised in Glamorganshire: the ashes spread over both lacings, green and burnt: by which it is supposed that the preserved grass roots in the unpared laces, mixed with the burnt laces on cross ploughing, produce quicker natural herbage."—*E. H.*

"Paring and burning is a very ancient practice. Liming with the ashes for the first crop, and dung with the third crop, to lay down in natural grass, was rec-

PARING AND BURNING.

d good husbandry on the old system: and yet, a complete paring and burning, the natural grass, ng been so exterminated root and seed, by the ticity of the alkaline salts and lime*, will be a time before it recovers itself sufficiently; whilst eeds of weeds, brought by birds or blown by winds, appear before the grass: hence the deficiency of s has been ignorantly ascribed to a deterioration of soil by paring and burning: but crops of sown es are, on such soils, the most luxuriant of any. true, if in addition to this extirpation of grasses, and is driven out by excessive cropping, the effects be very great: but even this does not prove that ng and burning, in itself, impoverishes the soil: he contrary is the fact; the soil is improved by it." W.

It is now common, on coarse lands, after paring

* *By the causticity of alkaline salts and lime.*" in the laboratory of the

and burning, to lay down with clover seeds the second crop. Lime is commonly spread with the ashes. Rye is sometimes the first crop ; at other times the two are oats.—*Hundred of Buallt, in Brecknockshire.*

“ The first crop after paring and burning is very abundant ; the land is then cropped to sterility ; then left to recruit itself from its worn out state for fifteen or twenty years ; until a surface is acquired to undergo the same operation. A practice more fatal to agriculture cannot be adopted.”—*Mr. Lloyd, Cardig. Lower, p. 16.*

“ *The first crop being abundant, proves that the land is fertilized : it is the over-cropping, without manure, that occasions sterility.*”—*E. W.*

“ Morassy land, drained, generally requires paring and burning the first year, in order to destroy the coarse surface ; which is exceedingly laborious to pulverize by the plough and harrow. The labour after paring and burning is easy ; and the ashes produced thereby, with about 120 bushels of lime to each acre, make an excellent preparation for a crop of wheat, turnips, or coleseed : after which, the only error to be avoided, is that of taking too many successive corn crops, before the land is laid down in grass.”—*Mr. Hassall, Caerm. p. 42.*

“ This mode of improvement is a good deal practised in Radnorshire, particularly in the breaking up of hide-bound and mossy pastures ; and is not found to be injurious to the soil. Paring is done by men, who charge from 25s. to 30s. an acre ; and this is best done in the month of April or beginning of May. The sods are burnt by women and children, who have 10s. per acre for their work. The ashes are scattered as soon as produced ; and the turnips, after two or three tilths,

PARING AND BURNING.

are best sown from the middle of June, to the first week in July. In places where manure cannot be well taken, it is recommended after paring and burning to sow oats for the first crop, and also the second, if it be an old ley; then lime, and sow a third crop of oats, and lay down with grass-seeds for the fourth year: but where manure can be taken without difficulty, the first year sow turnips with the ashes; second year barley or oats; third year manure well for turnips; fourth year, clover with barley to lay down." *F. L.*

We have already noticed the paring and burning the stubbles, as the only manure bestowed upon reclaimed fenny soil, during several successive years: we found in the hundred of Kemmaes in Pembrokeshire, that a repetition of paring and burning the stubbles was not considered as injuring the soil, by the most experienced farmers in the county.

Pembrokeshire, than any where we have noticed. In other places, men wear cushions like aprons, buckled around their waists, to moderate the violence of percussion; but here the cushion is attached to the head of the plough, which we do not deem an improvement.

In Cardiganshire we found men paring, burning, and spreading the ashes at 25s. the stang of 2560 square yards: on the New Forest enclosures in Glamorganshire, paring was performed for 28s. and burning for 14s. a provincial measure called *erw*, consisting of 5760 square yards. The Glamorganshire work is somewhat above 3s. per statute acre; but the Cardiganshire amounts to 47s. Some difficulty in the ground must have been alledged by the labourers, as the charge is nearly one-fourth higher than the average rate of paring and burning.

There are but few operations in husbandry, on which the opinions of men are so much at variance, as this of paring and burning. If we put the question to a vote, we shall find the writers of most of the Original Reports against it; and among others, those of the counties of Norfolk, Wilts, Monmouth, Lincoln, Nottingham, Lancaster, York, Cambridge, &c.

In opposition to this host, as we live in one of the most military ages in the annals of the world, we will place Colonel St. Leger as generalissimo; and with him Mr. Kirwan, Mr. A. Young, Mr. William Watson, the celebrated writer in the Agricultural Magazine, under the signature of *Agricola Northumbriensis*: we were going to add more, but we see the scale preponderate already on the *pro* side.

The *con*-s do not appear to have argued scientifically upon the subject: they see an injurious *effect*, but they lay the blame of it upon a *wrong cause*. Instead

MANURING.

d of reprobating the practice itself, they might have attributed the sterile state of certain lands, to the operation, to subsequent causes. With these errors, paring and burning lost its credit *on poor soils in the hands of poor farmers*: under such circumstances, every other operation in husbandry is equally liable to abuse. They ought, however, to have observed well the effects of combustion on soils a few degrees above sterility, or even *on poor soils under the management of good farmers*, and attest its speedy conversion of a nearly useless sward, into the pabulum of all vegetables or crops of corn.

Crops of wheat, turnips, &c. on light soils, are frequently liable to the ravages of the sod-worm, (*Gryllo-talpa*) see p. 42; and *paring and burning* of soils, periodically, is recommended as the safest preventive; the insects, or their eggs lodged in the sod, being supposed to be consumed by the fire.

gan, Monmouth, and part of Brecon. The Treatise is in the form of an "Advice from a Father to his Son;" and this part on manures, is here literally translated.—*D.*

"Know thou now, thy work in collecting manure, and every means possible to improve thy arable land.

"There are *three* kinds of substances which improve soil :

1. Manures from putrefaction (*pydredigion*) as dung of all sorts, rotten straw and vegetables, &c.

2. Fossil manures (*cloddiedigion*) such as virgin mould, sand, marl, clay, &c.

3. Manures of combustion (*llosgedigion*) that is, every thing that is burned, ashes of fuel, of rubbish on land, charred sods, lime, &c.

"Of the above three, manure and improve thy land, in alternation; because fertility cannot be so well supported without change, as a sameness would superinduce a torpor in the soil; but changing of manure will quicken, and incite it to a vigour of action. Manure and improve thy land once every three rounds of tilth. See what kind of improvement thy land requires; if dry, and exhausted or poor, give it a manure of putrefaction (*tom*)—if clay, cold, and wet, give manures of combustion: if too open, or sandy, bestow upon it fossil manures; and whichever of these the first tilth requires, remember at the end of three years to change the manure; and at the end of another term of three years, change again, without repeating either of the two former. Then liberate the land, and break up fresh land in its stead; and if thou canst not do that, repeat thy operations as before directed; and remember that thou plough no more land than what thou canst manure well; and judge as a sufficiency 24 cart.

MANURING.

ads, 20 bushels to the load, of putrescent and manures, and half that quantity of the manures bus tion *.

Where thou canst not bring the prescribed variety ure, bring to thy arable good soil of a nature nt from that which thou art about to improve. upon land, than the best of its own kind, is some of soil, though it contain but little of the es- of fertility; for land cannot be stimulated to a d action, but by the application of variety. In- of soil is the consequence of adding the same For that reason land is improved with a variety ; and an alternation of manures is necessary, as ers the soil brisk and lively, capable of bearing

author, in the copy before us, has not stated the quantity of which this portion of manure is to be bestowed: it must have ginally the provincial acre (*erw*) of the tract in which he

In some copies, apparently interpolated, the *erw* is defined to quare yards, "by the King's yards," which seems to date the

a longer course of tillage before it be laid down to rest. And when it is laid down, fertilize it with a top-dressing of a compost made of the three foregoing manures laid in alternate strata; and that to invigorate the powers of the soil to produce pasture and hay.

“ Collect putrid manures industriously, and upon that place virgin mould, layer upon layer; because the mould will imbibe and preserve the virtue of the dung. Let these compost heaps be out of the influence of solar heat.

“ Litter thy sheep once in a fortnight; the first layer of good mould; upon that, what straw thou canst spare: spread straw in thy folds and yards to increase manure; before March collect it together, where drought will not injure it: heat renders it effete, by extracting its pinguidity.

“ Dig thy marl when thou hast completed thy spring ploughings; expose it to heat; and when rain comes, stir the heaps, turning the roasted marl inwards, and the raw marl outwards; and this turning will cause it to crumble and effloresce, and collect fatness: and when winter and frost arrive, stir it again, that the weather may pulverize it; and when spreadable, lay it on thy land, and plough it in.

“ Where marl is not to be had, and a stronger soil required, bring friable clay, and lay it in small heaps on thy fallow; and when it falls, by the action of sun and rain, plough it in; and if it be convenient to procure either of the manures of combustion, invigorate the second tilth with it, by ploughing a ridge and top-dressing it; then another ridge, and so on, until the whole be ploughed and top-dressed, and after that harrow.

“ Where thou canst not manure before sowing, top-dress

MANURING.

the blades of corn with the pure manures of common, or with light fertile mould, or with light dable dung mixed with lime ; and where no lime, ashes. Simple sand improves little ; mix it with ; or mould, layer upon layer, and frequently and fully turn it ; then spread it on the last furrow but of thy fallow.

Where there is peat, dig it, and let it dry ; then thy hogs with it ; and upon that straw or fern ; when that becomes wet, place other layers of peat straw ; and so on alternately as far as circumstances permit. This is the richest of all manures : especially with a mixture of the manures of combustion.

Cut gorse, fern, thorns, and underwood, in winter where limestone is at hand ; plough a ridge seven s wide ; place thereon a layer of fuel, then lime, and so on alternately to the height of three s ; and make flues in the fuel in all directions, fire may pervade the whole heap. Then cover

of fertility from the atmosphere. And by shade and covering from the effect of heat, the essence is retained in summer, which we find like mouldiness attached to substances deposited in favourable situations. Hence soils having been under cover for ages, and even those of ditch banks screened from the sun, improve arable lands so much. For this reason, our ancestors were used to cover stripes of land with fern or straw; and in three months throw up the soil of the intermediate stripes upon the straw or fern, and cover that layer again for another three months; and so on for nine or twelve months; and at last these compost mounds were levelled over the ground, and sown, which produced abundance of wheat, barley, and oats. This was the primitive method, before the introduction of ploughs.

“ Carry dung to wet land just before ploughing; and carry it on hazy weather, that heat exhaust it not. Carry the manures of combustion on still weather, that they be not blown off by the wind. Plough on them speedily, that the soil may have them in their virtue. Then, when rain comes, the soil will effloresce, and attract fatness from the air; because from the atmosphere is derived the food of the soil, and from the soil the food of plants, and from plants the food of every animal that subsists upon the produce of the earth. The breath of God is in the atmosphere, and from that it emanates to every living being.

“ Do not bury dung too deep in the soil; rather plough through the dung; for it will endure twice longer when mixed with the soil, than when buried unmixed under a depth of surface.

“ If thou marlest, plough it in deep; because the nature of marl is to ascend, and the nature of dung to descend.

MANURING.

end. Carry not thy manure long before it be
ghed under."

had the Treatise, from which this extract is made,
with the publicity it deserved, and had its advice
followed wherever it was understood, our Welsh
bandry would have held a more eminent station in
ancient annals of Agriculture.

We shall follow our Author's division of manures,
three kinds; and *first*, of *manures from putre-*
tion (pydredigion).

Dung—farm-yard manure—excrements of housed
nals, with their litter of straw or fern, collected
heaps called dunghills, or provincially *mixens*
amenau), where the processes of fermentation and
refaction take place. This is the *chief* of manures,
g more generally useful, and more universally pro-

in new farm buildings, on the contrary, they have been commonly attended to.

By common farmers, little attention is paid to the form of the dung heap: upon declivities, the dung is only thrown through apertures on the lower sides of the buildings, to take its chance, to be carried away by water, or to have its essence exhausted by the noon sun: it is never regularly spread, or meddled with, except the heap, or cone, mounts so high as to obstruct the throwing out at the aperture.

In the better formed farm-yards, the heap is generally of a parallelopipedon shape, periodically dressed, as in the making of a hay-stack; which is necessary to accelerate putrefaction; that it may be in its richest state by the time it is wanted for turnips, or other crops. Less attention in spreading well the barrowful heaps, as brought from the buildings, will retard putrefaction, and put forward that crisis to the time the dung is wanted for autumn crops.

Much work, and distance from the farm-yard, occasion the carting out of dung, in spring or summer, to be laid in large heaps, in the fields where it is to be bestowed, or in convenient spots adjacent to them. This frequently obstructs the process of putrefaction, and the dung is become too effete by the time it is ploughed under; but this use of removed dung, is a misfortune that cannot every where be obviated.

Long dung, or muck, is preferred for potatoes; and may do well on grass lands top-dressed with it in autumn, winter, or early in spring; but the best state of this manure, for turnips, wheat, &c. is when it can be cut with a spade like butter, with its juices oozing out at every pore, at each operation of the spade: this state may be termed the crisis of putrefaction; before, the

MANURING.

is not ripe; after, the principles of fertility are operating.

In some countries, cheap hovels are erected over hills, to prevent their being over-soaked in rainy seasons; as well as to preserve their surfaces from over-drying by drought.

Mr. Johnes, in erecting a feeding-house at Hafod, which an elevation and description were furnished to the *Editor*, for the *Agricultural Magazine*, Vol. VIII. (1807), had a covered dung-pit made, sunk some feet into the earth, 50 feet long, and 12 feet wide; into which all the urine of twelve beasts runs; and into which all the dung is thrown through apertures made for the purpose, each aperture two feet square, and one placed between every two stalls.

In the southern and south-western coasts of South Wales, farm-yard manure is not collected in the quantities that might have been expected in a country hav-

saves the expense and labour of carrying hay out of them; greatly lessens the labour and expense of foddering the cattle, for they are foddered on the ground whereon the hay grew, and whereon it is stacked: the field is manured by its own crop. Estimate the loss in farm-yard manure, and oppose it to the above savings, and decide—*Which practice is the most beneficial upon the whole?*—*E. W.*

“Farmers should be careful that the liquid does not soak out of their farm-yards, as is too often the case: but cause it to incorporate with any refuse of straw that may be collected: we are, however, improving in Radnorshire, in paying greater attention than formerly to the collection and proper formation of dunghills. It is usual to manure the land on the sowing of turnips, wheat, and rye; but the soil is found not to want manure, if the field is laid down with clover, and broke up the following year.”—*T. F. L.*

Application of Dung Manure—is either in a pure state, or formed into varieties of composts, for hay and pasture lands; for potatoe and turnip crops, formerly too frequently to be succeeded by wheat in November; but now, more properly, for barley or spring wheat, in April. Where wheat is not a common crop, dung is bestowed upon barley crops; seldom upon oats, save where it is the only grain cultivated. Dung, without lime, immediately applied to wheat crops, they say, is not profitable; as a length of straw with light ears is the consequence: pea crops are frequently in the same predicament; hence the improved practices of applying dung—1. On pasture ley, one year, or more, before sowing wheat—2. On turnip crops, then barley, and clover ley only limed for wheat, excepting soil composts be added on shallow lands.

MANURING.

however, the common practice, on medium soils, whether in fallow or ley, is to lime in summer, "at six weeks before sowing;" and carry and spread immediately before the seed furrow in autumn.

In places, where the properties of lime are not understood, the lime is spread upon a ley, and then harrowed in upon a fallow, *before the dung is carried on*: the lime, by this time become effete and mixed with the soil, is changed into a powerful stimulant to the vegetation and growth of weeds, instead of a destroyer of them. In the Vale of Glamorgan, I know better, the native farmers at least, for they never spread *dung without covering it with lime*, whether on fallow or grass land. When dung is given to the plough, on the first or second tilth, as may happen convenient, when spread, add the covering of lime as soon as possible: let it remain a week, or, if signs of rain appear, until rain comes: the causticity

"The *sea ore* (as some call it) which is verie weedes growing under water in the sea, which are torne up by tempestes and rigges of the sea, and cast ashore with the winde and tyde; and, under low-water marke, may be gatherid and cut off the stones. The same is used by many, rather as muck or dong, serving for one year onely, than to be accompted as a durable amendment. This kind of ore, they gather, and lay it in great heapes, where it heteth and rotteth, and will have a strong and loathsome smell; which, being so rotten, they cast on the land, as they do their muck, and thereof springeth good corn, especially barley."—*MS. Hist. Pembr. by G. Owen*; about the year 1560.

This spoil of the ocean is found in good quantities, in the bays and creeks of the western coasts, after equinoctial gales. About 2000 cart-loads have been deposited in one night, near New Quay, in Cardiganshire; and carted off in about a fortnight. Some lay it fresh upon their lands in October, and plough it in immediately, for barley the following spring. We saw some laid on pea-brush, in Clarach Vallèy, to be ploughed under immediately, for wheat. Laid in heaps, in about a fortnight of mild and moist weather, or about three weeks of cold and dry weather, it putrifies thoroughly ("*cyn bwdred a b-w*"), and forms an excellent top-dressing for grass lands. "A Mr. Smallwood on Morfa farm, in Cardiganshire, some years ago, improved his meadow grounds by this means, very much, though he was not successful in tillage."

Some make composts of lime and dung with these seaweeds. We saw a compost heap carted out in September, for wheat; and if we might judge of its quality

MANURING.

its intolerable stench, it was indeed most excel-

the late Capt. Longcroft, of Llan Ina, made his posts thus—1. Shelly sand in a prepared cavity; 2. Farm-yard dung; 3. Sea-weeds, or tang, as the country afforded supply: and so on, layer upon layer for five months; and then cart out. “The manure excellent.” Others begin to copy the example.

This manure, applied in its simple state, is quick in effect; but one of the least durable. In the Cardiganhire barley tract, a dressing of *tang* cannot be depended upon for more than one good crop; whilst dry sea-sand will produce two.

We are not aware that sea-weeds are much, if at all, converted by combustion into *soda* or *kelp*, for the use of manufacturers, on these coasts; nor fern into *pot-*

II. Fossil Manures (*cloddiedigion*).

ing, that the stones have been worne by the sea, or some swift river; alsoe, in the hearte of the marle is formed dyvers sorts of shells of fish, as cockle shells, muskell shells, and such like, some altogether rotted, and some yet unrotted: as alsoe we shall therein finde pieces of tymber that have been hewne with edge-tooles, and fire-brands, the one end burned, and dyvers other thinges which have been before time used; and this twenty foote and more deep in the earthe, in places that have been digged before, and over the which great okes are now growing; and this seven or eight miles from the sea; so that it is verie probable, that the same came unto those places at the great and general flood.

“ They use the *marle* thus: it is digged and cast out of the pitte, carried to the lande, and there cast either upon the fallow or lay ground unplowed, and thus in the somer-tyme, in the months of May, June, July, and August; or after harvest, and at all tymes of the yere fit for casting of it, if the weather be fine, where it lyeth so on the lande all the somer and winter, the rain making it to melt and run like molten ledd all over the face of the earth: and if it be cast on fallow, it beareth *barlie* the next May; and if it be cast on lay ground, the same is sowed with *otes*, and every year after with *barlie*, for twelve or fourteen yeaes together, without giving any other mendment; and yealdeth corn very pure, clene, and of much yealding, exceeding the little kind of corne being otherwise tilled, both on the land, the barne floor, and in the mill. It will carry *barlie*, wheat, and pease continually for twentie yeaes without dong; and holdeth for many yeaes after in bearing of corne; being donged once every
three

MANURING.

beares, it will not seeke to have any rest or pause
to recover harte.

the lande before bore either furse, ferne, heath,
me, or any other kynde of shrubbes, the *marle*
destroyeth it, and causeth the grounde, be it
ill conditioned and barren before, to bring
the grasse, full of the hearbe called *trifolium*, or
clayed grasse, both white and redd, soe that in
her-tyme the lands will be covered with these
and will yeald a most pleasant and fragrant
proceeding from these sweete flowers.

this marle is of coller with us most commonly
and in some places *redd*; and I count it the
all other mendment found in this part of Wales.
fat and clammy, is of nature fertile and bind-
ed therefore is to be cast on barren land. If the
be moiste, the *lyme* rather serveth than this.
ground is found to be much amended with marle;

marked above a hundred yeares past, and yet continueth under corne to this day, and found to be good.

“This *marle* is found in Kemmes, and both Emlyns, from Dinas (north of Fishgard) up to Penboer in Caermarthenshire, being about 20 miles in length, and about four in breadth, in most places to the sea side.

“There is an antient memorial, by continuance of report, that the use of *marle* in Kemmes was first found out by one Cole, a Frenchman, who was said to have come into this countrey with Martin de la Tours, the conqueror of Kemmes*; who gave unto this Cole, being one of his company, the land called *Llwyn Gwair†*, where this Cole first found out the marle, and there did cast it first on the land. What truth this report carrieth with it, I refer to the judgment of the reader; but true it is, that *Llwyn Gwair* continued in the name of Coles for many generations; and on that land there is store of marle found, and several antient marle pits.

“It is a saying among the countrymen, of the continuance of the several amendements, that a man doth *sand for himselfe, lyme for his sonne, and marle for his grand childe*; thereby describing and comparing the durability of each kinde thereof‡.”

Stone marle—“Being a kind of stone digged out of a quarrey, and being laid on the land, casteth yearlie a fesse of sand, which in processe of tyme doth so mend ground, that neither the *lyme* nor the *clay marle* goeth beyond it, and carrieth corne and grasse in great abundance: these stones may not be removed from the land, for then the ground decayeth. The discom-

* In the 12th century.

† Now the property and beautiful residence of George Bowen, Esq.

‡ Now the adage is, “*lime for yourself, and marl for your son.*”

MANURING.

of this marle is, that the lande will be long be-
cometh to yeelde crops; for that the next 12
after the mending of it, it yealdeth smalle or
it, because the stones have not cast sufficient
boile, and therefore this kinde of marleing is
all for these many yeares; for I know not of any
place that hath scene lande amended with this
marle; but there are extant manie goodlie feedes
of hay, that have beene mended with this stone,
to the memorie of any man living. This was much
about Picton, Slebech, Wiston, Clarbeston,
and in many places adjoining, where the
marle is of this sorte, and the stones found in
abundance yet in the lande.

The quarreys of this kinde of marle are found at
and the partes adjacent; and it is sayd, that
it is burned into lyme, and that it is a soft kynde
of stone, but in substance verie gravelly. This
others accompted the most durable, though

The best application of this stone marl, if such it may be called, is to burn it into lime for manure ; for as such it is said to excel.

“ Brown limestone, a marly breccia, runs north of, and parallel to, the white-lime rag, between it and the coal tract. This brown lime has been found the best and most durable for manure ; but not so speedy in its operation as other limes.”—*E. W.*

The tract of “ clay marle ” runs, as Mr. G. Owen describes it, on the south of the Teivy, from the sea-coast near Dinas in Pembrokeshire, eastward towards Penboer in Caermarthenshire : from thence it crosses the Teivy into Cardiganshire, and curves towards the mouth of the river Aeron : forming, on the land side, an arc of a circle, the chord of which, along an indented line of coast, from the Nevern to the Aeron, measures about 30 miles ; the radius of which, from near Mount Church, in Cardiganshire, crossing the Teivy, to the parish of Penboer, measures about 14 miles.

“ Mr. Marshall had no high opinion of the quality of the Newcastle marl : in that neighbourhood none of the farmers use it. On the north of the Teivy, the Rev. Mr. Griffith of Llwyn Dyrys, and a few others, marl their lands.”—*Rev. Mr. B.*

“ The marl tract extends from the Pembrokeshire and Caermarthenshire hills, through every dingle to the sea, which washes Cardiganshire on the north-west, as far as Aber Aeron ; and there is hardly a parish within that line, without its dingle ; with abundance of land adjoining, proper for its reception as manure ; but, in general, it is *up-hill* work to carry it ; and has seldom been resorted to since the more general introduction of lime, which makes a more immediate return ; and is therefore

MANURING.

more suitable to the condition of our farmers, who
not the means, and are not in the habit, of giving
hands long credit."—*Rev. Mr. Griffith.*

On receiving this latter information, we are
glad to add, that its very worthy writer, to the loss
of the county of Cardigan, and the public in general,
is no more. As Secretary to the Agricultural So-
ciety, as an unwearied promoter of agricultural im-
provements, and a constant employer of numerous la-
bours, during his few years residence in his native
county, few have been more active.

During his lifetime, we had the pleasure of his com-
ing to his marl pit, on Llwyn Dyrys farm :

Top soil was a hazel mould loam of	1 foot.
Below till, tinged with the oxyd of iron,	2 feet.
Below brown laminar marl, of an inferior quality, ..	5
Below, blue laminar marl, on a slate rock,	12

of the Original Report of Cardigan Lower, in p. 12, writes thus :

“ Lime is a heavy expense in a poor country. *Marl* must be resorted to ; and from an experiment made, I am inclined to think we shall gain by the exchange. Upon land similar in soil and situation, turnips in the broadcast were sown and twice hoed : one part had been manured with 27 loads of *ding*, and two or three and forty loads of earth from roads and ditches, made into a compost : the second part with 120 loads of *marl* to the acre ; had a third more been added, I should have thought it better for the succeeding crops : the third division with 80 bushels of lime, spread as soon as possible, and turned in with the plough.

“ The *ding* compost produced a very luxuriant crop ; the largest turnips weighing fifteen and sixteen pounds, clear of root and branch, and measuring 33 and 34 inches in circumference. The *marl* and lime crops not above half the size. The turnips were eaten upon the ground by young cattle and sheep.”

Second Crop.—“ The barley from the *compost* produced 38 *bushels* an acre, and weighed 51lb. the struck Winchester bushel : the *marled* part 42 *bushels*, and weighed 52½ lb. : the *limed* part weighed 51½ lb. ; the account of the measure mislaid.”

Mr. Price, the present occupier of Kilgwyn, observes —“ That *marl* is more active when burnt ; it then becomes a more advantageous substitute for lime : it may be burnt with peat, and thus have two manures prepared at once.

Marl in compost with sea-sand, has been used with success on a fallow of poor soil, for white Lammas wheat,

MANURING.

at, by the late Rev. Mr. D. Turnor, of Wervil
ok.

to this anomalous western marl tract, we have to
varieties of marl on the southern limestone tract;
both together include all the marl that we know
in South Wales.

Southern Limestone Marl—"There are very large
l-pits in many places in Glamorgan, and very an-
t seemingly; for in them we find the largest and
t ancient oak trees, many of them decayed and hol-

The reason, says tradition, that it discontinued,
—*that the land had become tired of it.* A long
continuance in marling would doubtless supersaturate
soil with the calcareous ingredient: but a proper
rotation of manures would have prevented this effect;
unless this proper alternation will soon be recurred
the lands of Glamorgan will, to use the same lan-
guage of ignorance, become *tired of lime*: and this

a proverbial saying on the subject. From *marl*, after it has *ripened* in the ground, as the peasants term it, more plentiful and more numerous crops can be obtained than from any other manure or management. "Marl, however, is the manure of gentlemen on their own lands, or of tenants on long leases; never of those *at will*, or on leases of short terms; which expire before they can expect even a mere indemnifying return: hence the landlord cannot with any reason or justice, expect that his tenants *at will*, or for short terms, should ever, at their own expenses, marl their lands: a very common proverb says—

"*Lime and dung for yourself;*

"*Marl for your son or grandson.*"

"Soils whereon marls afford the speediest return, are those that are sandy, very light and hungry. Marl in large quantities gives them a closer staple, which repays immediately in some degree; and more and more every year. Such are the Norfolk soils in general; and on such, marl will in some, perhaps in an indemnifying degree, repay the first or second year: but to produce such a change in the staple of the soil, marls should be laid on in very large quantities."
—*E. IV.*

"*Kinds of Marl: White* marl is found in most of the little dingles of the rag lias tract.

"Brown and Isabella yellow marls, in strata, between the beds of limestone, in the flag and rag lias tracts.

"Brown marl in many places at the junctions of the white lime rag and flag lias; also north of the white lime rag."—*E. IV.*

2 MANURING.

Shelly Sea-Sand.—“ Another amendment which country yeldeth is the sea-sand, which is found in many places, but not in all partes of the sea coast. That is found in Newport, Dinas, and about these places, is reckoned the best; and the poeple knowing of it doe use, after spring tydes or great rigs of the sea, at which time the sea will cast the same in more abundance, to gather in greate heapes, and lay it out full sea-mark, and therehence fetch it in sacks on sebackes, and carie the same three, four, or five miles, and cast it on the lande; which doth very much better the ground for corne and grass; but this is not past six or eight yeares. This alsoe is much used about Cardigan, Mount, Verwick, and Langoedmor, in Cardiganshire, where it bringeth forth the best barlie, the most cleane, and in greater abundance, greatlie enriching the husbandmen there. ‘ I have scene of late yeares at Fresh-water East, in Castle Martin hundred, where they have digged sand

On the Llan Non barley tract, already described, it forms the chief manure, in perpetual alternation with sea-weeds or tang. Sand is found to be an excellent purifier of soil: the light soils of the western coast, harassed by long courses, are commonly over-run with the corn marigold (*chrysanthemum segetum*), more than any other weed; but it is seldom seen, nor indeed any other weed, where sea-sand is liberally used*.

About St. David's, it is spread in large quantities on the fallows. It is highly calcareous, from the abundance of sea-shells in it; most of them pulverized by the attrition of the tides: thus it is a good succedaneum for lime; and yet the farmers thereabouts use lime with it often: but this is chiefly when, with the sea-sand, dung, loam, or scrapings of roads, adding lime, they make compost heaps, of which, as well as of sand alone, they give 20, 30, and sometimes we are told, 40 cart-loads per acre, to their grounds. Many farmers take no more than three crops after this dressing, viz. 1. Wheat; 2. Barley; 3. Oats; and lay down in natural grass for three years. The crops are generally good, and the natural grass fine, full of the white clover, and very proper for sheep, the soil being dry and sound. If compost having dung in it has not been used on the fallow, but only lime or sand alone, then dung is given with the second crop of barley, or sometimes of pease.

"Between Milford and St. David's, about Haroldston, &c. they manure their light, meagre soils, with sea-sand, and that without much shelly matter in it."

"On the southern coasts, in Gower, &c. sea-

* "Shelly sea-sand destroys the corn marigold, so does lime; but both together more effectually."

sand, full of shells and pulverized limestone, as rich, or richer, than that of *Red Wharf* in Anglesey, might be plentifully obtained, in several places; but it is never used as manure. The carriage of sea-sand is expensive; it requires a strong team; and the southern coasts being nearly all limestone, lime is here preferred. On the western coasts, the case is different—lime is dear, and sand convenient, and more durable in its effect upon soil.

“Shelly sand was formerly used in the Vale of Glamorgan; but crow-garlic (*allium vineale*), a natural produce of the sea shore, being transplanted with the sand into the fields, caused its discontinuance.”—*E. W.*

3. *Peat Earth*.—We have already noticed the wide distinction that should be made between pure mountain peat, and that in favourable situations for the reception of rich alluvion. Many Scots farmers coming to reside in Wales, carried with them this error of non-distinction.

Whimsical indeed are the opinions of several writers on the virtues of peat as manure. Mons. Le Laillevault asserts, that peat is best for manure when it abounds with mineral particles, iron pyrites, copperas, alum, &c.! Mr. A. Young, (*An. Agr.* vol. ii.) combats this error successfully, by saying that “peat, fresh from the mine, is saturated with the sulphuric acid, which is a most powerful enemy to vegetation.”

Peat pulverized (*mwlwg mawn*), as a top-dressing on grass lands, may cherish a somewhat earlier vegetation, were it only by the covering it affords; it may
add

add to the staple of thin, meagre, or gravelly soils, where nothing better can be obtained; it may render clayey soils more porous; but its best use seems to be, in *composts*, with lime, or dung, or both together; under a litter of straw or fern in dry foddering-yards; as an absorbent of the carbonaceous liquid in the cavity of formed dung-pits, &c.

Peat and lime made into compost, is considered in most parts of South Wales as one of the best manures; and used by many. But limestone and peat are generally at considerable distances from each other: never together on the southern limestone tract. The middle range of limestone may have peat contiguous on the Black Mountains, &c. and the northern line of detached limestone rocks, may have peat convenient in some parts of the Caermarthenshire and Pembrokeshire slate tract, where coal is dear, and kilns might be constructed to burn lime with peat fuel, so as to procure a mixture of lime and peat-ashes, without the expense of coal. These northern lime rocks having a mixture of argill and sand in their composition, would render the compost with peat-ashes still more valuable.

J. Prichard, Esq. of Doly Velin, in Radnorshire, having peat-pits convenient to his farm, cuts great quantities, which, harvested and dried, he carries, perhaps 100 loads into one heap, on a convenient dry spot. The center of the heap is made hollow, for the reception of three, four, or five waggon-loads of clod lime; which soon sets the peat on fire, and the heap continues burning for several weeks. When cooled, he spreads the ashes and lime, well mixed, over his grasslands, and finds it a most excellent and energetic dressing. Having converted his whole farm into grass, he has use for varieties of composts, sediments of reser-
M 3
voirs,

voirs, clearings of water-courses, scrapings of roads, mixed first with lime, then with dung; and well incorporated by frequent turnings, &c. His original sown grasses were those natural to his soil: and by the virtue of these dressings they are kept perpetually vigorous.

More instances of this kind are reserved for their more appropriate class, viz. *Manures of Combustion*.

4. *Gypsum*.—The cliffs of Penarth and Lavernock in Glamorganshire, are stored with strata of this fossil; fine in quality, useful in architecture and statuary, but not applied to the purposes of agriculture in this district.

“Sea-water consists of certain alkaline salts united to the marine acid; which form a neutral not easily decomposable in common earth. *Gypsum*, being lime and vitriolic acid, when well soaked in sea-water, the vitriolic acid will in time quit the lime, seize the alkaline basis of sea-salt, and set the marine acid at liberty; which, being volatile, will escape. Then you have lime and a neutral salt, found by experiment to be an excellent manure, when formed into composts with much earth. Without such a mixture with earth, these salts would be too pungent for causing vegetation.”—*Dr. Alderson*.

The gypsum cliffs in Glamorganshire, being washed by the tides, afford conveniency for preparing this chemical manure: but query, after all, whether any preparations of gypsum for manure will ever answer the expense?

5. *Sea Slime or Mud*.—“It is said by some writers, that the ose or slyme of the sea carried and layed on the lande proveth provitable; but this hath not bene used

used by anie of this country, that I could heare off; yet doth the sea yield plentie of it in creeks and havens."—*G. O. Pembr.* about 1650.

The Welsh seas are generally too turbulent for this kind of deposition, in great quantities. By analysis, it is found to contain "a large quantity of mucilage, not much saline matter, much calcareous earth; the residue is mica and sand, the latter is much the largest proportion, but both in extremely comminuted particles."

To the five foregoing fossils may be added, 1. *Loam*, on any soil of a different quality; 2. *Clay*, on sand; 3. *Sand*, on clay: and either, or all, on peat well limed.

III. *Manures of Combustion.*

1. *Lime*.—Formerly the use of lime, as a manure, was mostly confined to the vicinities of lime rocks: now, the country having become more of a thoroughfare, by means of more convenient roads in every direction, canals, &c. lime is become the most general in its application of all manures; even in the most inconvenient corners of the slate tract, where it is exorbitantly dear.

In the limestone tracts lime was in common use from remote times.

"The cheefest natural helpe to better the lande, I reckon the *lyme*, for that it is most commonlie used, and found to be less charge then the marle. The lymestone being digged in the quarrey in great stones is hewen lesser, to the bignesse of a man's fist and lesse, to the end they might the sooner burne throw; and beinge hewed smalle, the same is put to a kill, made of walle, six foote high, four or five foote broad at the brimme, but growinge narrower to the bottom, having

MANURING.

lope holes at the bottom, which they call the kill
s. In this kill first is made a fire of coles, or ra-
colme, which is but the dust of coles, which is
in the bottom of the kill, with some fewe stickes
woode to kindel a fire; then is the kill filled with
se smalle hewed pieces of lymestones; and then,
being given, the same burneth for the space of
*, and maketh the lymestones to become mere redd
y coles; which being done, and the fier quenched,
lyme so burned is suffered to coole in the kill, and
n is drawen furth throw these kill eyes; and in this
e is carrid to the land, where it is layd in heapes,
next shower of rayne making it to molter, and
e into dust, which they spread on the lande, and soe
e wheate or barlie therein, as the tyme of the year
uireth: but in the lower partes of the shyre, where
lyme is most used, and theire lande verie drie of
lfe, they are forced to muck theire lande the first
re with the lyne: but in the verie mountaines,

Kilns.—Such kilns as the above, described in the 16th century, containing from four to five tons of limestone, are still in being, in several places. About 40 years back, *perpetual* kilns were introduced: the first of this kind in Glamorganshire was built of fire brick at Cardiff, about that period: its diameter at top seven feet ten inches and a half; for two feet six inches in depth it was a perfect cylinder; for seven feet two inches more, it was an inverted section of a cone, the lower diameter being two feet three inches; it then became a cylinder again for two feet three inches more, which was the breadth of the base at the pipe; the whole depth twelve feet.

Since that time, much larger kilns are constructed of fire brick, on canals, and in other places, where much lime is in request. Some of these are only ten inches diameter at the pipe; twelve feet at the middle, and ten feet at the top; and from twenty-five to thirty feet deep; containing about thirty waggon-loads of lime, each load from sixty-two to seventy-five bushels.

These large kilns are at work during most of the summer lime season, drawing upon an average about nine waggon-loads each per day. Other kilns of smaller dimensions commonly lie contiguous to the former, to furnish farmers or others, upon an emergency, with five or six waggon-loads early in spring, or late in autumn, &c.: these contain from 25 to 30 tons of limestone each.

The constructors of the latter kilns seem to have had in view a greater concentration of heat, to save the waste of fuel, by accelerating the process of calcination, owing to their elliptical shape.

In the extensive limestone tract of the Vale of Glamorgan, there are but few public kilns for the sale of
lime:

lime : every farmer is a lime-burner ; raising the stone in the field to be manured ; so that there is scarcely an arable field to be found without having, either at present or formerly, a lime kiln within it. The stones are too frequently raised, and the kiln erected, in the middle of a fine field : some indeed raise the stone and erect the kiln on the side of the high road, where it is over-broad ; and thereby convert a private eyesore into a public nuisance. In many instances, kilns might be made, with equal feasibility, in the more useless corners, or on the slopes of small dingles, places inaccessible to the plough, but more *accessible* to the limestone strata. Of late, landlords have very properly interfered.

These kilns, built of limestone, require to be rebuilt or repaired frequently ; once in a season, where the farmer useth much lime : one new kiln is about two days' work for a mason.

Fuel.—On the maritime side of the vale, a farmer commonly buys a sloop load of *culm* from Neath, Swansea, &c. which is unloaded at the most convenient creek, from whence he conveys it to his farm.

On the northern side of the vale, fuel is more conveniently procured from the pits of the adjoining coal tract.

The limestone of the eastern part of the middle range is burnt with *slack*, or refuse of the *running*, or of the *coaking* coals adjoining : that of the western part, from the river Neath to St. Bride's bay, is burnt with *culm*, being the refuse of the *stone coal*. This *culm* is carried into the coasts of Devon, &c. North as well as South Wales, for burning lime. The Neath and Swansea *culm* is generally of superior quality to that
of

of Milford, and sells 2s. a ton higher, in Cardigan-shire, &c.

Lime Measures—Are exceedingly various and puzzling :

1. The *Winchester bushel* of eight gallons has been forced on the lime burners in several places, Aberystwyth, &c. by order of the Quarter Sessions. The bushel is made of rolled iron, eighteen inches and a half in diameter, and eight inches deep, according to the statute ; but farmers complain that, since this innovation, they pay dearer for their lime than before.

At the Radnorshire lime rocks, the measure is nominally standard ; but as it is sold for 8d. and the provincial measure of ten gallons for 10½d. ; if the prices are in direct proportion, it is only seven and a half gallons.

With these small measures, the common usage is to give heaped measure: the vendors therefore procure their vessels of a conical shape, like the old standing churns ; so that a heap on a surface of about ten inches cannot be considerable ; and more than that, clod lime will not close so well in filling, as if the cone were inverted.

2. *Barrel*, is a measure of three provincial bushels of ten gallons each, equal to three and three-quarters Winchester ; in use on the Brecon and Abergavenny canal ; at the lime kilns of the middle range in Brecknockshire, &c.

The measures are made square, of boards or planks, without bottoms, being laid upon an even floor : they are of all sizes, from one barrel to six, or more. When filled, the guage is taken off, to be replenished, whilst its former contents are thrown into the vehicle, and so on.

WEIGHING.

In some convenient places, Llangynydr, &c. measures, filled at the kiln's mouth, are slid on an inclined plane, to drop their contents at once into a cart or waggon, which affords very expeditious loading. Among provincial measures, this guage promises the fairest dealing : but *here* cheap; tricks of trade, and slight of hand, are, consequently not so profitable.

A barrel-guage is also sometimes made out of the head of an hogshead, the bottom taken out. In some parts this measure or quantity of lime is denominated "a load," &c.

Cranock (*crynog*) is a term of uncertain origin; a measure of indefinite quantity, if we refer to the old dictory accounts given of it in Glamorganshire, a county to which it seems peculiar; part of Monmouthshire perhaps excepted. By one person's information it makes nine Winchester bushels, by another fifteen: but at last we concluded it to be of

of limestone as the Brecon barrel, but more to the west, in Caermarthenshire, &c. This is exactly the *Irish barrel*, as settled by law for coals and salt.

This teal is again called a barrel in Pembrokeshire; of which, as well as in Cardiganshire, there are two varieties: in Pembrokeshire, one of four, the other of five bushels: in Cardiganshire, that of four bushels is called *tél-bach*; another of eight bushels is termed *tél-mawr*, being a Winchester quarter. Two of the long teals, or 16 Winchester bushels, make a *tunnell*, being the average quantity of clod lime procured from a ton weight of limestone, brought by sea from Pembrokeshire, &c.

Price of Lime—Means of improvement are commonly scarce and dear, where they are most wanted: so it is with lime. On the fertile banks of the Taff, Ely, and Romney, in the eastern part of the Vale of Glamorgan, lime is to be had at kilns on the spot for from $1\frac{1}{2}d.$ to $2\frac{1}{2}d.$ per bushel. At Aberystwyth in Cardiganshire, lime is now advanced to $16d.$ per bushel; and when half that sum is charged for its carriage, along bad roads, to a considerable distance, it will amount to 2s.—“To apply less than 80 bushels to an acre” (according to a Radnorshire farmer’s expression) “*is doing nothing*.” This then must be done, in some luckless parts of Cardiganshire, not excepting the corners of some adjoining counties, at the expense of 8l. an acre, for lime only, carriage included; whereas the farmers in the land of plenty, may bestow three times the quantity upon an acre, for about one-third of the expense, including a charge for carriage. “*Three times three is nine!*”—Remember this part of your multiplication table, and apply it to this subject,
in

in places disadvantageously remote from limestone and coal—ye valuers of land, who are employed, *because* you value high.

Application of Lime in Tillage—1. As a preparation for *wheat*:—On summer fallows; alone, with dung, with ashes of un-reduced sods:—On pared and burned land, with ashes:—On a preceding crop of pease; either harrowed in with the seed, or spread on the young plants; sometimes the additional dung is bestowed on the pea-crop, sometimes reserved for the wheat seed-furrow in autumn:—On a clover ley, spread in June, after the first grazing or mowing:—On old leys, about the same time; in good soils without dung: on inferior soils with dung, ploughed under at seed time.

2. *As a preparation for turnips, or other green crops*; either harrowed in before the seed, or spread upon the young plants, to preserve them from the fly and slug; or partly both, which is considered as the best application.

3. *As a preparation for barley*, on old leys, in the western counties, where barley frequently begins the course; carried in summer, laid in small heaps, and ploughed in, with dung, in autumn, to be ploughed again in the spring, and sown.

Sometimes, on such old ley, lime is spread two or three years before it is broken up; it then ploughs and harrows more kindly, they say, than by a later application. There is a plausibility in this, exclusive of the test of experience; and that the more valid, as coming from the observation of rustics, who judge by their senses more than by theory.

On summer fallows, some spread the lime on the first tilth, some on the second, and work it in well with long tined

tined harrows: others defer it till the fallow is worked, then spread, and leave the rains to wash it into the soil: thus they procure what they call the *lixivium of lime* (*leisw calch*).

Modes of laying down Lime to slake (effloresce):

1. In *large* heaps, containing a waggon-load, sometimes two or three loads each: some cover the lime with soil; some turn the heaps with shovels once or twice; others do neither of these operations. This is the practice in parts of the eastern counties.

2. In *small* heaps, of about a bushel each, in regular rows, in the same manner as dung: some cover them with the mould of the fallow, but most do not: some spread the lime as soon as well slaked, others not for months, until it is what is termed *effete*. These small heaps is too common a practice in the eastern, and almost generally so in the western counties.

Farmers accustomed to lay their lime on fallows or leys, in aggregate heaps of several loads, say—that it effloresces better; that it turns out a “*greater outcast*” when fallen to powder, than if laid in smaller heaps, than even in loads of 60 or 70 bushels each.

“The general manure is lime; but there seems to be very little skill in the general application of it as a manure; particularly in those parts of the country which lie the most remote from it: the lime is commonly laid in *small heaps* upon ley ground, or on land sown with oats; where it lies several months before it is spread on the surface, and then it has more the appearance and texture of old *mortar* rubbish than of lime.”—*Mr. Hassall, in Caerm. p. 16.*

“Lime and half-rotten dung are the manures chiefly in use: the quantity of lime from three to five cart-loads,

loads, each cart containing 16 bushels : and even this is injudiciously applied, by leaving it scattered over the fields all the summer in *small heaps*, until the dung be carried out preparatory to ploughing."—*Mr. Lloyd, in Cardig.* p. 11.

"It is a received opinion in Glamorgan, that on *light soils* lime should become *effete* before it is spread ; but on *strong soils*, it should be covered over with earth as soon as laid in heaps on the field, and as soon as sufficiently slaked, spread, and by some also harrowed, and immediately ploughed into the ground, before it becomes *effete* ; where it will, by its causticity, destroy the roots of weeds, and also produce a strong fermentation, that will powerfully open a strong soil : but this would not do for a light soil : on such, let it remain in heaps till quite *effete* : then spread it ; and if it has had so much rain as to convert it into *mortar*, bush-harrow it, and this will finely pulverize it again.

"I have here used the term *mortar*, out of compliment to some writers who seem fond of the expression. By them, lime is thus converted into "*perfect mortar*"—soil is reduced to a "*caput mortuum*," &c. &c. ; but lime will never be converted into mortar, wetted by rain gradually, and not immediately worked, or chafed up : it gradually becomes *effete*, re-imbibes or absorbs carbonic acid, or fixed air, and it can never afterwards be made into mortar : it is only white earth, no better for the purposes of building than any other common earth : it may, like other kinds of earth, clod pretty hard ; but it will, on being harrowed, bush-harrowed, &c., more easily and speedily pulverize than clodded clay, or strong loam ; and is never the less efficacious as a manure for being so clodded ; it only occasions a little, not much, more trouble. False theories may
brow-

brow-beat a simple but honest and industrious farmer out of a very warrantable and convenient practice; and by so doing, do a great deal of harm.

"Some writers insist on lime being applied in its quick state, and affect to ridicule those who think that it should become effete before it would be proper to work it into the soil.

"On strong stubborn soils it should be applied and worked in as quick, or hot (as they term it) as possible, to open and pulverize the soil: where weeds are to be extirpated, it should also be applied quick; but on soils already sufficiently, perhaps too light, it should never be worked in before it becomes quite effete, otherwise it will render the soil too light: and it fertilizes only by its fixed air, of which in its quick state it is entirely divested; but which, on becoming effete, it recovers*. Lime on light soils is never the worse for lying ever so long in heaps on the ground before it is spread†, where extirpation of weeds is not an object: this is asserted by one whose upwards of fifty years almost daily experience in lime, is far beyond the experience of all the mere farmers or mere theorists that ever existed."—*E. W.*

* The two component parts of fixed air, oxygen and carbon, are jointly expelled from limestone, in the act of burning: the lime then, newly slaked, is pure caustic lime, its fittest state to be incorporated with fresh soils, matted with roots of fern, &c. Lime afterwards, in becoming what is termed *effete*, recovers from the atmosphere part of what had been expelled from it by burning: the question then is, for my information as a farmer, being no chemist,—*Whether lime recovers fixed air in its combined state of oxygen and carbon, or oxygen only?* If the latter, I would never willingly let my lime become oxygenated before it is spread and worked into the soil; for chemists tell me, that oxygen is not favourable to vegetation.—*D.*

† "*Effete lime*—converts putrescible substances into mucilage:

Quick lime—a forcing manure."—*Dr. Fordyce.*

S. WALES. VOL. 11.] N

Quantity

Quantity of lime per acre, varies commonly in an inverse ratio to the distance from limestone and coal; or in direct proportion to the feasibility of procuring it. In the remoter parts of the shale and slate tract, from 50 to 60 bushels may be the average: the exceptions are persons of property, who think a heavier liming more effectual: these may lime *as they please*, whilst the majority of the tenantry must lime *as they can*.

"Besides the dung from the farm-yard, lime is the principal manure in Radnorshire; though, in consequence of its high price, it is not used as much as it should be. The proper quantity of lime that should be put on an acre is 60 bushels; and if possible, not less than 50. It is remarked, that if land be limed strong for several years, its powers thereon becomes gradually diminished. The benefit of lime remains in the land for three years. The mixing of lime with road-soil, sediment of ponds, &c. is becoming more general, and is the most durable manure: the lime should remain to incorporate with the soil for a year before the compost is used."—*T. F. L.*

In Radnor Upper, farmers sometimes carry lime from Old Radnor, sometimes from the Montgomeryshire canal; the former, they say, is much more ponderous; if so, its excellence as a manure, may be owing to its insinuating itself more actively into the soil.

In Brecknockshire, more conveniently situate than Radnorshire, for cheap lime, the average may be from 70 to 120 bushels per acre.

In the hilly ramifications of the Vale of Towy, they give from eight to ten teals of lime to an acre; this is only from 40 to 50 bushels. A small quantity like this is found to have a more visible effect upon the soils of the shale and slate tract, than even double the quantity upon soils of a more calcareous nature.

On the northern side of the Vale of Towy, soil light, on the grey rab, common to the shale tract, from 75 to 100 bushels per acre: on the south of the Towy, on a stronger soil, they bestow from 125 to 150 bushels per acre.

The strong soil of Llangharne Marsh, requires from 160 to 180 bushels per acre.

In Pembrokeshire, the quantity of lime given in fallowing is, on light soils from 50 to 80 bushels; and on strong soils from 100 to 150 bushels per acre: with ashes of burnt sods, about 50 bushels.

In the Glamorganshire coal tract: "The quantity of lime for top-dressing, about one-third of the quantity requisite for a summer-fallow; the quantity for clover ley nearly the same, though more would be better; the quantity for autumn-fallow for wheat, from one half to two-thirds of the summer-fallow allowance, which is 25 cranocks, or 250 bushels."—*E. Morgan, Esq.*

Heavy liming, within this district, is peculiar to the Vale of Glamorgan. Coals are cheap at Newcastle; and here limestone lies under every field.

Sir Edward Stradling, the last but one of the Barons of that name of St. Donat's Castle, probably from a favourable opinion he entertained of the good effect of copious liming upon strong loams, was the first who reduced it to practice, upon his own farm, about 60 years ago. His example was followed by Mr. Morgan, Mr. Jay, and others; until at length the practice became general along the whole extent of the *lias tract*, from St. Donat's to the mouth of the Ely. Since the commencement by Stradling, it is said that much of the *lias tract* has undergone the liming ordeal twenty several times. A common quantity of lime on clover ley for wheat, is from 200 to 250 bushels per acre;

and on a summer-fallow, in its caustic state, from 400 to 500 bushels. Taking the average at 300 bushels, twenty times repeated it amounts to 6000 bushels; which in 60 years is 100 bushels an acre, every year, without intermission.

Don't you think that such quantities of lime, repeatedly bestowed, will at last render your soil less productive?

Ans. "No: As long as the soil retains its appetite to *eat the lime*, there is no danger; but if once the lime begins to *eat the soil*, we must beware. By this copious liming our strong loams, or rather clays, are rendered more tractable in all kinds of seasons; they do not harden so much on sudden transitions from moisture to dryness."—*Mr. Matthews.*

What corroborates this assertion is, that the whip and rein ploughs, with two horses a-breast, work with apparent ease on the soils about Boverton, &c. which had undergone copious liming from nearly the commencement of the practice; but further north, on soils originally the same, on the same limestone basis, but where copious liming had not been practised so early, these kind of ploughs are still worked with some difficulty.

White lime is said to be a stronger manure than the buff-coloured lime of the lias species, in the proportion of five to three: this would reduce 450 bushels of lias lime to 270 of white lime per acre, to be applied on the strong lias soils; but on its own native and lighter soil, from 100 to 150 bushels per acre, are found sufficient.

Price of burning lime.—In the Vale of Glamorgan, a few years back, "one hundred cranocks, of three Welsh bushels (*llestraid*) of 22 gallons each unslaked, of four ditto slaked, were burnt for 30s. One hundred cranocks is about 50 butts, or cart loads.

"Formerly

"Formerly the stones were broken too small for burning well; they lay too close, admitting no free vent for either air or heat: in the other extreme, they are not now broken small enough. The burners, however, impute the badness of the lime to this or that coal, to the nature of the stone, weather, kiln, &c. any thing but the truth; and the farmers too easily give them credit."—*E. W.*

At Old Radnor, the labourers find blasting tools, powder, and baskets;—the masters find bushels, picks, and shovels, &c., and pay their men 8s. per 100 bushels, of about seven gallons each. At Stockwell rock, where the stones are raised with more difficulty, they charge 10s. or more per hundred.

Culm, the refuse of stone coal, affords more intense heat (weight for weight) for burning lime, than the slack or refuse of other species of coal; viz. the running and coaking kinds. At St. Fagans, in the Vale of Glamorgan, running coal brought from the pit at 4s. per ton weight, and 5s. more for carriage to the kiln, will burn 80 bushels of lime, sold there for 2d. a bushel.

At Aber-porth, north of Cardigan, and other places on that coast, farmers buy the raw materials; stone from Milford at 5s. 6d. per ton, and a barrel of culm, (four heaped bushels) to burn it, for 2s. 9d. and 8d. more for the lime-burner. A ton measure of culm will weigh about 17 cwt. equal to the burning, were it ton weight, of about 90 bushels of lime; being about one-ninth superior to the running coal for that purpose.

At Aberystwyth, limestone is said to stand the burners in 7s. 6d. a ton; a barrel of culm to burn it, about 3s., both together not amounting to above one-half of what it is charged to the purchasers at the kilns: here,

wharfage, pilotage, &c. &c. must be high indeed ; for freightage, and tax tonnage on coal, are already included in the 10s. 6d. A ton of limestone, yielding 16 bushels of lime, at 16d. per bushel, amounts to 21s. 4d.

"Lime is sold at the sale kilns in Norfolk at an high price, 14s. per chaldron; and this presents a formidable obstacle to the general use of it in Agriculture: but notwithstanding the high price of coal, I am persuaded a farmer could burn his own lime at 9s. 6d. a chaldron."—*Dr. Hinton, in Norfolk Report.*

"A great trade for limestone is carried on along the coast of Gower in Glamorganshire; several hundred cargoes being shipped off for the coast of Devon, &c. during the summer. The vessels employed in this trade are from thirty to eighty tons burden. The people of the country get a good livelihood by this means; the men dig the stones both winter and summer; and as the vessels trade only in the summer, they get together several cargoes by the commencement of the trade: the men break the stones, after blasting the rocks, to a size easy to be lifted up; the women then, having a horse, and a little staked car made for the purpose, convey the stones to the shipping places within low-water mark; and at high water the vessels are moored alongside the heaps, which are known by poles being fixed in them, and there wait till the tide begins to ebb, when they are thrown into the vessels (by means of a temporary stage) by men and women, who receive a good hire from the captains, with an allowance of beer. The stones are sold by the quarrymen at the rate of 1s. per ton, or so much the cargo; there is also a duty of 2d. and in some places 1d. in each shilling, paid by the captain to the lord of the manor, for permission to raise the stones.

"Near

"Near the *Mumbles*, several perpetual kilns have been erected by Messrs. Yalden and Pemberton, who ship off great quantities of lime for the county of Devon: and as coals are here procured at a cheap rate, and no duty being paid for the lime carried across the channel, they are enabled to sell their lime to the merchants of Devon cheaper than they can burn it themselves there; especially as the expense of carrying the limestone and coals (for the latter of which they pay duty), is very great. This speculation is likely to prove advantageous, both to the consumers of lime and to the undertakers of the concern."—*Rev. J. Collins.*

Notwithstanding much limestone and lime being carried over the channel from Glamorgan to Devon, yet in return, limestone from the vicinity of Plymouth is brought as ballast to Swansea, and Neath, &c. and from thence, by the canals, up to the lime rocks of Brecknockshire. This is carrying coals to Newcastle: but the looseness of the Plymouth limestone in its stratification, and cheapness of ballast carriage, must account for it. Some of the Plymouth stone is beautifully variegated, and has a magnesian feel, very different from the primitive limestone of the middle range, which it here approaches.

Effect of Liming.—What batable ground—what contradictory opinions crowd upon us!

Lime on the Sward.—Do you still lime profusely?—

Ans. "We lime too much, except we limed upon the sward."—*St. Asaph.*

"Lime does no good on the grass lands: mixing it with the soil is the only way."—*Dr. Anderson.*

"Lime upon the sward becomes nitrated, when it has insinuated itself under the vegetable surface."—*Naismith.*

MANURING.

Clays.—"I hardly ever knew a soil, unless it
chalky bottom, but that either chalk or lime
improve."—*Mr. W. Hall, Kent.*

say, neither chalk nor lime will alter the quali-
the *strong cold clays*: lime is of excellent ser-
reducing the land to a *caput mortuum*."—*Mr.*
n of Cleveland.

me does all the good possible for *clayey* soils."
J. Jenkinson, Lancashire.

me has often been used to break the cohesion of
soils; but the writer of this section would not
end it; for he never found any advantage from
y when applied to *clays*."—*Scotch Encyclo-*

r. Young supposes that on common soils, not
nated with acids, and not abounding in putres-
atter, 160 bushels of lime per acre will be suffi-
which should be doubled or trebled on *strong*
ys."—*Complete Grazier.*

made a great number of observations on strong clay land, by spreading lime on some places, on others not, but never could find any difference in the crops, except the *first liming*, which is found beneficial; but *repeated limings have little or no effect.*"—*Mr. Norman.*

"Fresh land requires less lime than that which has been long in tillage."—*Mr. Jenkinson.*

"One manuring of lime will often be found highly beneficial; but *repeated ones have little effect.*"—*Mr. A. Young.*

"One good *liming* at first, better than *small and frequent repetitions.*"—*Eccho.*

"An application of a *moderate quantity* of lime from time to time, whether mixed or not with peat, is much to be preferred to the general prevailing practice of laying lime at once, and in great abundance, upon ground, for these reasons:

"1st, A great quantity returns to its original state of chalk, before an opportunity offers of its being spread.

"2dly, Too great a ferment by lime occasions a too immediate dissipation, in a gaseous state, of the vegetable matter of the soil, from which the succeeding crop only can be benefited: hence an *economical and frequent* application of lime, either pure or mixed, is by far preferable to the abundant dressings of lime, which cause too violent an action on the soil to be conducive to, or compatible with, a continued state of fertility. Lime *moderately* used, is an alterative corrector; a decomposer of certain parts of the animal and vegetable substances of soils; a retainer of, and combiner with, others; and is not to be regarded by the practical farmer as a substance fit for the immediate food of plants, like dung, &c.—*Lord Dundonald.*

"The stupidity of barbarian farmers is such, that they do not even know certainly, whether *lime* be serviceable

viceable at all; or if it be, whether it is by repetition, whereby the ground comes by degrees full of lime, as the phrase is. Farmers know little of the adage that, by forcing the grounds, *lime makes rich fathers and poor sons*, or *rich tenants and poor landlords*. Landlords know nothing of lime, it appears, from their stipulating with their tenants for the adduction of certain quantities."—*Mr. Belcher, An. of Agric.* 17.

We ask Mr. Belcher's pardon, lest our Welsh barbarian farmers should not behave so politely to him. It is true, but not the least reproach, that common farmers cannot account philosophically *how* lime acts upon soil; but did they not find its beneficial effect upon soil, would poor farmers, who have not a penny to throw away, continue to carry it every year of their life, on horseback, and in small carts, the distance of 20 or 30 miles, along bad and up-hill roads? Did they not find the benefit of it equal to the expense, after two or three unsuccessful trials, they would undoubtedly have discontinued a practice so laborious, expensive, and absurd: but so far from this being the case, we were informed at a sea-port, where lime sells for 16*d.* a bushel, that ten times more is now carried than twenty years back.

"None of the uncultivated wastes can be reclaimed *without lime*: dung can be applied to a better purpose; and paring and burning, without lime, is a bad practice: the ashes alone may throw out two or three miserable crops of oats, though no herbage; but *with lime*, good wheat, oats, and grasses.

"Lime is much approved of as a manure: its effects on all our soils, *is to be seen to an inch*."—*Mr. Turner, Cardig. Report*, p. 27, in 1796:—"to be seen to an inch."—*Eccho by several subsequent writers.*

"As a farmer, I know that my lands are unproductive

tive *without lime*; and that unless this first necessary be laid on them, all future manuring is not of half the service it would otherwise be: as for quantity, I believe the more you put on, the better. My soil is hazel mould and till, more or less of either, in combination; upon a slate rock; and it is very well known that great quantities must be laid on, or it had better be left alone."—Dec. 20th, 1812. *John Davis, Brechynrafon.*

"All the dung in the world *without lime*, will never procure good wheat in Cardiganshire, north of Pembroke, and other similar parts of the shale and slate tract: it will only produce an abundant crop of straw, with very little corn; and that little frequently smutty."—*An Old Farmer.*

From the unanimity in opinion respecting the usefulness of lime in this district, it seems strange that such a diversity should exist elsewhere: but this diversity may be owing, in some degree, to the several abettors not understanding each other, for want of a more explicit definition of *soils* and *limes*. What one writer calls *clay*, another would term only *strong loam*: in one county in this district we found clay called *marl*, and pure marl termed *clay*. The varieties of peaty soils, we have already noticed. There are also varieties of limes, some pure, and others adulterated with ingredients not very favourable to vegetation. The primitive limestone seems to be the purest from foreign mixtures. The secondary limestone rocks are in many places considerably charged with magnesian earth, which, according to an ingenious essay in the Phil. Trans. for 1799, by S. Tennant, Esq. makes the lime containing it of far less value as manure. Chalk
lime

lime is to be distinguished from that made out of indurated limestone.

To say that "lime has a good effect upon rich loams, whilst its effect is scarcely visible upon poor soils," is saying nothing in its favour. *Rich loams* are not proper subjects for experiments on manures. A rich loam, *with lime*, produces a good crop; it may be capable of producing a good crop *without lime*; but if lime has been found materially to improve *very poor land*, without the assistance of any other manure, its character as an improver is established beyond dispute.

Let two instances suffice on this subject, where lime was used as a top-dressing on very poor upland moors in the coal tract:

1. The Rev. Fleming Gough, of Ynys Cedwyn, in the Valley of Tawy (Brecknockshire coal tract), tried lime on the sward of 22 acres of a sideland moor (*gwaun y gwair mân*, as he termed it), being a spongy peat of few inches, producing a scanty crop of mosses, carexes, &c. upon a substratum of retentive clay. After hard rain, though on an inclined plane, there was no walking over the ground dryshod; the sward retaining rain-water like a sponge. Mr Gough being indisposed at the time, he did not attend to the quantity of lime, nor to the spreading of it before it was effete; but from the effect produced, and the proximity of the kilns, the quantity must be great. The lime was spread in August, after the scanty crop of rosy hay had been carried off: in the spring it was bush-harrowed and rolled; this was however imperfectly performed, as the lime was so much incrustated, that the clods much impeded the mowers the first harvest; the
crop

crop visibly improved. The second autumn the lime clods were beat with beetles, and bush-harrowed : the second crop produced new species of grasses, superior in quality, and four-fold the quantity of the former crops.

Mr. Gough did not drain the piece previous to liming; if there were no springs it was not necessary : lime dried the surface by destroying the mosses, which theretofore retained the rain water, and made it appear as if it wanted draining. Lime also had a beneficial effect upon the surface soil, in rendering it productive of sweeter and stronger grasses.

It may be remarked, that part of the 22 acres was top-dressed at the same time with a compost of *lime and peat*, turned several times. The effect of the two manures did not vary much the two first years (1810 and 1811). On such a soil, however, we would give the preference to pure lime, unless the lime had reduced the peat to ashes. The compost consisted of six parts lime to 40 of peat.

2. In tracing the coal tract, it was necessary, though out of our district, to begin in Monmouthshire. In passing through Sirhowy, in that county, we were struck with the contrast between one solitary field of the finest verdure, and the surrounding waste of "auburn hue." Wondering, and enquiring how it came there? we were informed, that it belonged to one of the proprietors of the iron-works; who not being at home, we were under the necessity of gleaning as well as we could, the following information : that the piece was originally a rosy upland moor, like the adjoining waste; that it had been drained where necessary, and that caustic lime, to a vast amount, lime being very cheap, was spread on the hungry sward : that all
vegeta-

vegetation speedily disappeared: that in two or three years the field began to be covered with new and strange species of grasses, which gradually improved to its present state. A large cylinder of cast-iron is rolled over the surface, in March, to repair the winter poaching of horses, which depasture the aftermath, and to consolidate the surface of a crumbly peat-soil, on a substratum of clay. This piece has been further improved annually with the stable-dung of eighty horses, besides coal-ashes. We examined the stack of hay it produced in 1811, to see what species succeeded the moss and pink-grass of former days; and found it to consist of cock's-foot; dog's-tail; vernal-grass; the woolly holcus; wild trefoils; yellow-rattle; and some aquatics, owing to imperfect draining, or the effect not yet complete. In quantity, the crop seemed to be at least 30 cwt. per acre, and in quality far superior to the hay at the inn adjoining, which had been brought upwards of 12 miles from the Vale of Usk, near Abergavenny.

It is to be regretted that more such sterile land is not improved in this vicinity; where lime and ashes are so cheap and plentiful.

Along the verge of the middle limestone range, there are numerous hillocks of the refuse of deserted lime kilns, consisting of several tons of effete lime-ashes, and other adventitious substances: these would be well worth the carriage into the adjoining rosy moors of the coal tract; were they near such hungry soils in the slate tract, they would be gratefully accepted.

It is generally agreed, that *lime* is best applied in a state of *compost*: with bulky substances it adds staple to ebb soils, and invigorates the exhausted. Sediments of ponds

ponds and canals, scourings of watering courses, scrapings of roads, &c. have lost their credit with some farmers, because they were prematurely applied in a raw state, and the first crop did not answer their expectation: such substances mixed with clod lime, should not be used for nine or twelve months, and during that time they require two or three turnings. Ignorant men say, that in composts "*lime loses its strength*:" so it does; but by so doing it invigorates the whole mass. No lime goes to waste in making of composts, which is a material point in places very distant from the kilns.

Making much good compost is however a laborious undertaking, which many persons are willing to avoid: hence headlands, in many places, by the gradual adduction of soil by ploughs and harrows, &c. are a foot or more higher than the rest of the field: this is convenience to the indolent.

Pure lime is to be preferred only in cases of emergency;—where no materials for composts are convenient—as a top-dressing to destroy vermin—as a corrector of acidity—as a destroyer of nuisances, roots and useless vegetable matter in fresh soils, &c.

"Underwood of thorns, briars, gorse, broom, &c. have been grubbed on the surface when in full leaf, burned into ashes, and lime spread thereon in great quantity in June: left in that state till the following spring, when the ground was tilled, without any obstruction to the plough, as the roots were perfectly rotten."—*Vale of Ely: lime 2d. a bushel.*

Having been tedious on lime, we must be more brief on the remaining manures of combustion.

2. *Braes*—is a manure peculiar to the coal tract; being

being ashes and coal-dust, the refuse of the coaking hearths, where coal is charred for the use of blast furnaces, &c.

“ About four years ago, I tried the following dressings, upon about eight acres of meadow land, dry soil, divided into three parts, and manured as follows :

1st part—with stable muck mixed with *braes*, a small coke which drips from the air furnace grates :

2d part—wholly with slack of coals, that we generally throw away in large quantities :

3d part—with a compost ; half lime, mixed with road and pond dirt.

Effect—No. 2, exhibited grass like a green ribbon, before the others shewed any spring :—No. 1, followed :—No. 3, was last ; and proved the smallest crop of hay. Since that time, I dress the dry lands every year with the *coal slack* alone, or mixed with lime, and have better crops than formerly from the same lands, which are *very poor*, and used to give only short hay fit for cows. I now carry from 20 to 30 cwt. of good horses' hay, and have the stable muck left for the ploughed lands.

On wet peaty soils, I find the *braes*, mixed with lime, answers better than any other dressing we have.—*Richard Crawshay, Esq. Original Report of Glamorgan, p. 71.*

“ *Braes* is a good dressing for cold rushy lands : its effect is evident, upon cold mountainous soils, near all the iron works. Pink grass, after draining, and the application of *braes*, disappears in a year or two. On land not very wet, *braes*, and coal-ashes, plentifully applied, will kill pink grass without draining.”—*Edward Frere, Esq.*

3. *Ashes*

3. *Ashes*—of all kinds, whether from vegetables or fuel, is of acknowledged utility as a top-dressing; especially near towns, and great iron-works, where it can be procured in considerable quantities: even where the quantity is small, and well preserved, its effect is obvious. Cottagers, who have hay ground for the winter keep of a cow, close at their door, carry out the ashes of their fuel, whether coal or peat, every morning fresh from the hearth, from November to March, and spread it on the sward, which causes abundant hay crops, even on poor soils.

Lime mixed with any kind of ashes is said to improve it: laid in alternate layers, in clods, with coal-ashes, it reduces the cinders of the coal in a few hours, into fine powder.

We have already noticed the burning of peat soil into ashes by means of quick-lime:—"Among other means of procuring compound top-dressings, I recommend the combustion of peat by lime: *first*, put together a large heap of peat, on a dry spot; cover it over a foot thick with clod lime, all but a little at the top for a vent; and the first rain that falls will set the whole on fire: put on more peat, and it will freely burn. Make as many heaps as necessary for the field; which being ready, mix the compost, and spread thereon. The sooner rain falls the better. It improves too humid grass-land very much: the first year white clover will cover the field, even where it was never seen before; and the second year ribwort will appear with the clover.

"Where fallows are dressed with lime and peat, thus prepared, or with lime, and a large quantity of coal-ashes, there is not the least necessity, in this climature, for sowing any grass-seeds with the last crop of barley or oats, for the white clover will be produced

WEEDING.

ndantly as if thickly sown. For dry soils, some in-
at of a denser staple, as muck, crude peat, loam,
gs of roads, &c. should be added.

oo little lime mixed with the peat to reduce it,
tle good or none; where perhaps twice the quan-
ould in any case improve the soil for many years,
here draining has been previously done, would
mproved the ground for ever, by irrecoverably
the peat.

ude peat spread on the sward of a hungry gra-
oil, produced more than double the usual quan-
grass and hay, for many years.

oal-ashes is an excellent manure for barley; and
descriptions of wet lands, on which it will always
e white clover. Broad clover top-dressed with it
l, will produce double the quantity of hay or pas-
-*Evan Morgan, Esq. Glamorgan coal tract*.*

Most farmers weed their crops in the manner already described in Ch. VII. and VIII. on *Arable*, and *Grass Land*.

“ Women and girls are here employed, in May and June chiefly, to weed the corn: this is done with a weeding hook, at about 8*d.* per day, or from 1*s.* to 2*s.* per acre. The corn marigold and poppy, infest the corn fields very much; but less on the limestone tracts than elsewhere: on the limestone, docks and thistles are the most common weeds. Limed fallows are tolerably clean: manure from farm-yards always occasions weeds: sea-sand in a considerable degree destroys them. Of all weeds, the corn marigold is the most difficult to extirpate.”—*E. W. in Pembroke-shire.*

“ Care is generally taken to keep the corn free of thistles, dock, and fern: other weeds are not much attended to, except before the grain is sown, when industrious farmers take care after each harrowing to cause the roots to be raked, gathered together, and either burned or hauled off; that none, especially of the couch-grasses, may remain.

“ The annual mowing of fern, nettles, &c. off the pasture land, about Midsummer, contribute gradually to destroy them.”—*T. F. L. Radnor Lower.*

SECT. V.—IRRIGATION.

WATERING of grass land, seems to have been in considerable vogue beyond the memory of the oldest persons now living. We only know of its having been practised, by the vestiges of small canals in several
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IRRIGATION.

gles, along which the streams, diverted from their natural channels, were conveyed, on a regular sub-surface, into the lands to be irrigated. How the water was afterwards managed we are entirely ignorant ; as time has, long since, erased every vestige. Most probably it was an art not well understood at the time, and was, in the issue, entirely discarded ; and so continued until within these 20 or 30 years.

Radnorshire.—"Watering is very much attended to in those parts of the county where it can be of service ; particularly in the lower parts of its narrow valleys, where it is of great benefit. In the central parts of the county, watering is not so advantageous, the soil is of a clayey nature, and not so susceptible of benefit ; and yet in dry seasons, watering, even in these parts, will be found to be beneficial, if managed with judgment."—*T. F. L.*

rized, are all swept off by the first autumnal floods, and lost, if not turned upon the grass land.

“ The features of the country, from the great number of hillocks and swells in which it abounds, renders it in a peculiar degree adapted to derive every advantage from flooding; because the water moves quickly off, as soon as it deposits the wealth with which it was charged round the roots of the grass.

“ After they have cut the lattermath grass, they turn the waters on the meadows the first flood, for they always prefer flood to clear water: they suffer the water to run over the ground for two or three days *only*, never longer at one time. At the end of ten or twelve days, they turn it on again for the same space of time, and so on, till the end of March. Since, however, they cannot get floods to happen at stated distances of time, they are obliged to use the water when they can catch it; but if they had their choice, they would not wish to flood oftener, nor for a longer space of time.

“ Should they neglect to flood their meadows for one season, a loss of from one half to one third of their usual crop would be sustained.

“ The farmers here are very sensible of the benefit of having water from the farm-yard turned over their meadows; and they are very careful to have *the field under the house always a meadow*. The good effects that the droppings from the farm-yard and fold have upon this sandy land, is really astonishing.”—*Mr. Clark*.

Mr. Clark, undoubtedly hit upon a good subject, in this county, to commend irrigation; its *soils* being commonly thirsty, and its springs and streams (from sandstone rocks and hills, having little or no foreign admixtures) commonly free from obnoxious matter

IRRIGATION.

traction in the width of the gutters. This piece, before it was made into a meadow, was little better than a bed of rushes; but it soon became worth three times an acre.

Mr. H. Portlock, a skilful irrigator from South Wales, after being employed for several years in South Wales, and having taught numerous pupils, "went about doing good" into South Wales, where he has been actively employed by Mr. Talbot, Sir John Morris, Mr. Johnes, Mr. Phillips, Colonel Wood, and others.

Mr. Portlock contracted with Mr. Talbot, for a lease of twenty acres of land, unprofitable as it then was, being lately recovered from the sea, and producing only aquatic weeds, for 1s. per acre, per annum, for 20 years: the lessee to drain, to form the land into a complete watered meadow, and deliver it up in perfect repair at the end of the term. Mr. P. and Mr. T. are willing to take a number of such leases,

numerous brooks, from a considerable way up the slopes of hills, that might be drawn with ease, along proper channels, over large extents of ground; and but little skill is wanted.

“On the limestone tracts, brooks and springs are very deficient; seldom any where a sufficiency for watering on a large scale.”—*E. W.*

The limestone tract, in every county it occurs, seems as it were gaping for irrigation; but the streams, as it were insulting it, frequently sneak underground, and disappear for miles.

Caermarthenshire.—“Several occupiers of lands, whose situation admits of making watered-meadows, are become attentive to that valuable mode of improvement: its advantages are generally known. However, there remains yet a great deal to be done in this branch of husbandry, and many advantageous situations lie neglected. Pond-making seems to be far behind-hand among the farmers; without which, much of the advantage of watering is lost; as the muck and other manure washed down from the roads and hills in the summer-season, cannot be detained for want of ponds and reservoirs.”—*Mr. Hassall.*

“The modern system of irrigation has been adopted by a few gentlemen; but it is by no means become general in this county.”—*Rev. Mr. B.*

Few counties are better circumstanced for watering: the brooks and springs are numerous, and the soil commonly appropriate. The honourable proprietor of Taliaris demesne, has irrigated extensively and systematically.

Cardiganshire.—*Mr. Lloyd*, in the Original Report
of

of the lower moiety of this county (p. 9, 10), describes his own mode of irrigation; and declares that he thereby rendered his land of five-fold value. "I begin (says he) watering early in November, or sooner if I can, and continue until the latter end of March: by the latter end of April the grass is, in a southern aspect, sufficiently high for the reception of my cows and calves."

"The importance of watering is well understood; gentlemen, and most of the principal farmers, practise it judiciously; and as every glen has its rill, very considerable improvements might be made by a due attention to it."—*Mr. Turnor, Cardig. Upper*, p. 25.

"Many streams running through farms-yards, are still permitted to carry away the richness thereof into the next brook; and so on, as it were by a pass, from constable to constable, down to the sea."—*Note on the above, by T. M.*

We do not find that any of the Agricultural Societies of the district have publicly encouraged irrigation, excepting that of Cardiganshire; which, from its first institution, among varieties of rewards, offered the following:

"To the person who shall improve the greatest quantity of meadow or pasture lands, (not usually overflowed in times of flood), by throwing water over it in the most equal and judicious manner; the quantity of land so improved not being less than six acres—three guineas."

"The next greatest extent, as in the last premium, not less than five acres—two guineas."

In consequence of the above rewards, irrigation gains ground in the county; for,

In four years previous to the year 1805, we find premiums bestowed for irrigating 54 acres; and in
four

four years subsequent to 1805, premiums for 159 acres; which shews nearly a threefold increase in quantity, in an equal period of time. One tenant, in 1809, claimed for 50 acres.

Cardiganshire is very favourably circumstanced for being improved by irrigation; its soils are mostly dry and sound; its rills numerous; and the water free from mineral pollution, excepting among the lead-mines, where its effects are equally deleterious to fish and grass.

SECT. VI.—CLEARING AWAY STONES FROM LAND,

THE siliceous rocks of South Wales are much less in size and fewer in number, than those of North Wales: hence fewer depositions of large masses of stones, called by some, *boulders*, on the surface of the land; as these masses are generally of the siliceous genus. The middle limestone range, in some parts, abounds with huge fragments of its own species, as if the skeletons of whole rocks had been deposited there. The boulders of the red sandstone tract are commonly foreign to it; being mostly of pudding-stones: which sometimes also occur in the shale tract, where the mountains for many miles each way consist of an uniformly friable shaly rock. The pudding-stones, or breccias, contain in some instances, fragments of chert, quartz, with now and then limestone marked with shells; and all strongly cemented together. Nodules of whinstone, trap, porphyry, also occur. Some fields in the shale tract of North Wales are so full of these, that to clear them would be endless. We have seen one improver, tired
of

CLEARING AWAY STONES FROM LAND.

ing powder to blast them, resorting to another
ive means, namely, cutting caverns under-
them, and sinking them out of the reach of the

only instance of an expensive improvement of
nd that we noticed in South Wales, was at
Cedwyn in Brecknockshire. Several acres of
pasture near the mansion, were in one night co-
with vast depositions of stones, brought from the
bove, by the river *Twrch*; the lake from which
ed, in the Black Mountains, having burst its
upon a sudden thaw. A Welsh *Englyn**,
sed at the time, fixes the date of this inundation
year 1652. The stones remained, where they
eposited by the river, for nearly 150 years. At
the late Richard Gough Aubrey, Esq. set about
reulean task, and cleared the ground, at an ex-
greater than its fee simple value. The tonnage of
arried off, formed into buildings, walls, &c.

CHAP. XIII.

LIVE STOCK.

SECT. I.—CATTLE.

THE most ancient account of the colours of Welsh cattle we are possessed of, is that in the Laws of Howel the Good, in the tenth century ; where the compensation to be made by peers for three kinds of injury done to the Princes of Aber-Ffraw in North Wales, and of Dinevawr in South Wales, was fixed at "100 *white cows with red ears*;" and a bull of the same colour and marks to every 100 cows; and this number for every *Cantrev* in the possession of the transgressor : and if the cattle remitted were of a dark or black colour, then 150 in number for every 100.

The same number of cattle, of the same colour and marks, were to be presented by the Prince of Aber-Ffraw to the King of London, when he made his homage to him for his Principality.

Speed records, that Maud de Breos, in order to appease King John, who was highly incensed against her husband, made a present to the Queen of 400 cows and one bull from Brecknockshire, *all white with red ears*.

Some writers imagine that this white colour with red ears is a peculiarity of wild cattle ; because, perhaps, such wild cattle are still preserved in a nobleman's park in England : but cattle of this colour may have been originally selected for the purpose, and the
breed

breed has still continued without contamination. Cattle of any other colour, it is presumed, under similar circumstances, would in time become equally wild and ferocious: witness the cattle of different colours becoming wild in the woods of New Holland, and America.

The laws of Howel were promulgated about the year 942 or 943: nearly 800 years afterwards, when Dr. Wotton and the Rev. Moses Williams published them with a Latin translation, they mention in the Glossary annexed (voc. *Ysgyfarllynig*) that *white cows with red ears* were then reared with attention on the banks of the Towy in Caermarthenshire: there is not, however, at present, any attention paid to the kind, in any part of the district.

The present stock of cattle in South Wales, are divisible into *four* kinds; three apparently native, and one foreign.

1. The coal-blacks of Pembrokeshire:
2. The brownish blacks, or dark browns, of Glamorgan:
3. The black runts of Cardiganshire, Caermarthenshire, and the western parts of the counties of Brecon and Radnor:
4. Introduced breeds, from Herefordshire and Shropshire, into the eastern and more fertile parts of Brecon and Radnor.

1, 2.—*Pembroke and Glamorgan.*—*Description, colour, &c.*—The *black* breed seems to have been the original breed of Wales: it is still the most general. The squat runts of the mountainous and interior parts seem to have been the parent stock; from which, owing to milder climature, more nutritious

tious grass and hay, greater attention in breeding, &c. sprung, in length of time, the present superior breeds of *Anglesey* and *Pembroke*.

The shades of difference between the *Pembroke* and the *Anglesey* breeds are but very faint; they appear pretty clearly to have been of the same original stock: the excellencies and deficiencies of each are the same.

The *Pembrokeshire* cattle are generally of a coal-black colour, with exceptions that are very rare: often finch backed, and white frequently on the belly, legs, &c.; occasionally bald-faced, but these latter the drovers are not fond of buying: they are well made and proportioned; though not perhaps sufficiently wide between the pin-bones: shorter legged than the *Glamorgan*, and longer than the *Montgomery*: horns of a middle size; bullocks generally strong horned, turning upwards, and occasionally entangling each other when drawing in yokes: not so fine in the head, neck, and breast, as the *Glamorgan*, but finer than the *Anglesey*.

It is supposed, and not without strong probability, that the cattle of *Glamorgan* were formerly of a colour different from the present: some Welsh writers of the 13th or 14th century, whose names we do not now recollect, allude to their *redness* of colour; and D. T. the Welsh Topographer in 1720, says of them—

“Gwartheg mawr, yn goch a brithion,
A blew crin, a phennau crynion.”

i.e. “Cattle large, some *red*, some *pied*; with sleek coats, and fine heads.”

Mr. Lawrence, in his “General Treatise on Cattle,” published in 1805, indulges a conjecture, “that, after all, this famous race of *North Devons*, may be a permanent

CATTLE.

manent variety growing out of an original stock of red cattle of close affinity to the Welsh mountain breed, crossed and rendered fine, through a series of crosses, by Norman or Alderney bulls, or the descendants of such, easily communicating with the hill country from the Devonshire coast. The proud swelling of the neck is a characteristic of the Norman bull, and, perhaps, generally of southern stock."

Some few anecdotes may throw light upon Mr. Lawrence's conjecture:

Robert Fitzhamon, the usurper of the lordship of Glamorgan, in the reign of William Rufus, is said to have been also lord of Astreville in Normandy.

Sir Richard de Grenaville, one of the twelve Knights who took possession of the lordship of Neath in Glamorgan, was also lord of the manor and castle of Bidford, on the northern coast of Devon, where the "proud crested" stock of red cattle are still reared.

Since the conquest of Glamorgan was achieved by

the black breed ; many of them having white faces like the Herefords, but much smaller. Tradition says, that these are the ancient stock of Glamorgan Vale.

The red cattle of Gower are good milchers, finely formed, and fatten sooner than the browns of the Vale, but are not so large ; and therefore better accommodated for the home markets, as well as for walking to distant parts : their beef much more tender and delicate than the larger sorts.

“ The *red* cow gives the best milk,” is a proverb well known from Dennis Brulgruddery’s house in Cornwall to Holyhead ; and inn-keepers, taking advantage of the proverb, frequently hang it up as a sign, indicative of a good tap.

The present race of Glamorgan Vale cattle, are more various in their colours than any other purely Welsh breed : the prevailing and favourite colour is a *dark brown* ; some are of a deep red, some nearly as black as the Pembrokes ; and we find them of all the different shades from red to brown, and thence to black : and we now and then find some of them pie-bald, sometimes almost white, but such are but rarely seen.

In the fore part, head, neck, limbs, horns, lively eye, &c. they seem the nearest in resemblance to the deer-like shape of the North Devons ; and have more of the “ proud swelling crest” than any other Welsh breed we know. Their symmetry is well preserved as far back as the flank, where many of them fall off ; and the rump, or fixing on of the tail, rises too high, to accord with the prevailing notions of symmetry : though some more perfect figures are exceptions to this observation.

One year we met in Castle Martin, with Mr. Shaw,
S. WALES. VOL. II.] P (query)

CATTLE.

y) employed by Lord Somerville to take drawings of species of live stock throughout South Wales : these drawings have been published, they will be satisfactorily descriptive than any thing we can

comparisons.—"It is certain, that Pembrokeshire is a very excellent breed of cattle ; a better for the purposes scarcely any where to be found ; and for that not much, if any thing, inferior to any other, and superior to most. They have something of docility in their nature, and are sometimes in teams more manageable than the Glamorgans, which are considered as the most gentle and tractable breed known. A Pembroke and Glamorgan ox, each of the same age and in the same condition, turned at the same time into the same pasture, in six weeks time the difference will be considerably in favour of the Pembroke ; and the Pembrokeshire farmers : those of Glamor-

in puffing his own breed, so that the truth cannot easily be known : both breeds are certainly good. At Trevecca in Brecknockshire, where it is said fair trials had been made, the question, which fattened most rapidly, was decided in favour of the Glamorgan. It is pretty certain, that the effects of such trials would be different on different soils, and under other different circumstances. A farmer in the eastern part of Glamorgan, on a strong limestone loam, having tried both, decided in favour of the Glamorgan : another in the western district of the same county, on a light gravelly but rich loam, found that the Pembrokeshire fattened sooner than the native breed : each of these farmers were of understanding and experience superior to the generality of their class. A principal farmer in this western tract, and on the same light but rich sandy loam, with some parts of his farm of a pretty strong soil, gives the preference, in the case under consideration, to the Glamorgan ; but, like some others, thinks, that on coarser soils the Pembrokeshire blacks are preferable to the Glamorgan."

"It is said that the Pembrokes become quicker saleable beef than any other Welsh breed. Some of the most favourite of the modern breeds disappoint the butchers, in turning out worse than expected ; but in this way the Pembrokes seldom disappoint : but, on the other hand, they generally prove better than their outside appearance and touch indicated."—*E. W.*

"Of the stock of Pembrokeshire farmers, horned cattle claim the first consideration, as being by far the most valuable stock they possess.

Of late years, farmers have been very attentive to the improvement of their cattle ; by rearing bulls from their best and cleanest shaped cows ; by which our

black is now getting into very considerable repute in the neighbouring counties; whose breeders send to our markets for bulls, which however are not sold at extravagant rates.

All the English as well as Welsh drovers, who drive cattle out of this county to the feeding counties in England, agree, that the true Pembrokeshire ox is the favourite beast with the graziers. The oxen of this county seem to get rid of their steery figure sooner than those of other countries. When turned of three years old, they have an ox-like appearance, which I do not recollect to have seen elsewhere; and if well kept, they will grow and get beef fat in the fourth year. The black ox bears his journey well; and will improve in his flesh as much in three months as some will in five."—*Mr. Hassall.*

In 1794, two-year old Pembroke bulls sold for from eight to twelve guineas each; since that time, year-

oxen, four or five years old, in a store condition after working, commonly sell for from 20*l*. to 25*l*. each : graziers are fond of them, having less coarse meat in their beef than most other breeds : they are more tender-footed than the Pembrokes, which are hardier, and will appear better than ours after walking to Smithfield, Kent, &c. The Glamorgans, being so *thin-hided*, should certainly be housed in winter ; but I have no buildings to house them ; the manure gained would amply repay the trouble."—*Mr. Gale, a Gloucestershire Farmer, resident in Glamorgan for several years.*

" Winter-foddering in open fields began in Glamorgan Vale—for cows about the year 1730, for oxen about 1760 : before those periods they were regularly housed, as in other parts."—*Mr. John Spencer.*

" The Pembrokes will fatten in Kent much sooner than the Glamorgans : many of the latter are handsome cattle, but for fattening I cannot commend them highly."—*A Kentish Drover at Cowbridge.*

" The Glamorgans are the most tractable of any ; and to be fattened to the greatest profit, and in the highest perfection, they should be worked from three till six years of age : when it is so, their beef is the finest of any, well marbled," &c.—*A Gloucestershire Drover at Kilgeran.*

" The Glamorgans are more impatient of thirst than the blacks ; and for that reason, unless well attended, they fall off more in long summer journies, through dry countries : the turnip season is the best for driving them."—*An English Drover at Newcastle Emlyn.*

" Mr. Knight only notices the Sussex or Devon cattle, as entering into competition with the Herefords.

CATTLE.

re is another breed that, I suppose, he is ignorant
I mean the Pembrokeshire blacks; which, if but-
s, or those who work cattle, may be credited, is at
equal to those he has mentioned."—*Verax*.

I beg leave here to observe, that there is another
s of men to be consulted in this matter, besides
atchers, and those who work oxen;" the fancy or
gment of the grazier should be at least equally
ulted by the breeder of oxen, with the above-
ed persons. And if the grazier will invariably
five pounds more per head for oxen of the Here-
shire, Sussex, and Devonshire breeds, than for the
brokeshire blacks, surely the breeder ought and
pay due attention to the decided preference of the
ier. But besides this, in general both the butcher,
the person who works, entertain the same predi-
on, and no doubt their opinion is formed on the
and of absolute merit.

Had *Verax*, or any Pembrokeshire farmer, risen to

Extent of Tract, Weight, &c.—The Pembrokeshire breed occupies the whole of the county, with the adjoining parts of Caermarthenshire, and over the Teivy into Cardiganshire.

The average weight of ox beef is from 9 to 10 score per quarter : cow beef, well fed, from 6 to 7 score.

The chief pastures are in the hundred of Castle Martin ; and consequently cattle bred thereon are of a larger size ; good oxen weighing from 11 to 12 score, some 14 ; at Stackpole Court, some have reached from 15 to 16 ; but it was said that they had a taint of the Leicester cross.

Among the Glamorgan Vale browns, good cow beef weighs from 8 to 10 score per quarter ; though some may be from 12 to 13 : ox-beef from 12 to 14.

The best pastures are on the grey or rag lias tract, from Lantwit Major eastward. R. Jones, Esq. of Fon Mon Castle, and others, rear oxen of 18 score : one ox at Boverton, though of a Guernsey cross, weighed near 20 score.

For reasons already given, the fore quarters are in general the heaviest ; when well fatted, they are of course nearer an equality.

In the mountainous valleys of the Glamorgan coal tract, Eglwys Ilan, Gelli Gaer, Llan Wynno, Ystrad Dyfodwg, Aber Dâr, Glyn Ogwr, &c. the cattle bear considerably the features and colour of those of the Vale ; but the breed having probably been kept more pure without crossing, and being housed in winter, the cattle are of a more compact shape, deeper chested, fuller in the flank, shorter legged, and comparatively good milchers ; but of course considerably of a smaller size. Were the farmers of the Vale to bring down

CATTLE.

the mountainers into their superior pastures, house them in winter, and pay attention to breed from the finest young bulls and heifers; for a series of generations, they would probably become more successful than they have been in the cattle-shows of London. In the Vale they want undoubtedly to get totally rid of the length of leg, a scantiness of flank, and a rump higher than the back: in every other respect, the mountain breed has certainly a claim to superiority. The hides of the Vale breed are however better adapted for coach harness, than for the making of strong shoes.

Higher up in the coal tract, the Glamorgan cattle still preserve, in a great measure, their features; but in the north they diminish into mere pigmies: here, from three to four score a quarter is deemed good beef. Near the collieries we observed kyloes, brought thither by the proprietors, picking their scanty subsistence among the rocks, and skipping the naked mounds like fallow deer. These diminutive beings answer their purposes

those in the neighbouring parts of Pembrokeshire and Caermarthenshire. The richness of the land, and perhaps a greater attention in selecting the best for stock, has made the only difference."—*Mr. Turnor, Original Report, Cardigan*, p. 22.

"The stock (Cardigan Lower, on the Teivy, &c.) is black cattle, of the Pembrokeshire breed. The English drovers are fond of them, and when the markets are open, they find a ready sale at high prices: they are hardy, work and travel well, and take on fat kindly; and our best improvement would be to give them better food in winter."—*Mr. Lloyd, in Cardigan Lower*.

Caermarthenshire.—"The original black breed of the country is the most prevalent; and is a short-bodied coarse kind of beast: on the mountains these cattle are very small; and in the vales and better lands, they get up to larger sizes; but are almost every where ill-shaped, and unprofitable to the pail. It is a very general opinion, that something ought to be done towards improving this race in shape, size, and milk."—*Mr. Hassall*, p. 35.

However, considerable improvement has taken place in the black stock of this county, since Mr. Hassall wrote; by the more general introduction of breeders from Pembrokeshire, and some from the Vale of Usk. The late high prices of cattle was a sufficient excitement to the improvement of stock. We saw at Llan-gadock fair lean bullocks, three years old, sold for from 14 to 17 pounds a-head.

As to the working quality of the Caermarthens, we were informed by Sackville Gwynne, Esq. of Glan Brâu

CATTLE.

in Park, that he bought five three-year old bullocks in the winter of 1810 ;—began working them immediately, singly in collars, and continued ploughing with them through the spring until barley seedness was over ; feeding them with straw and some turnips ; and, when they worked hard, with some hay : the following summer, they went constantly, six days in the week, eight weeks together, for lime to Llangadock, the distance going and returning being 18 miles, the road hard and stony : they were shod in the common way : in August they had a little respite ; worked again at wheat seedness ; and were sold the following January at 5*l.* each more than their prime cost ; and then being five years old. We are apprehensive, however, that the servants had access to corn, unknown to Mr. Wynne. For work on a farm, oxen are now very seldom shod.

Cow beef, in the vales, weighs from six to seven

We saw at Gell Gwynn, being

4. *Radnor and Brecon*.—"The horned cattle in Radnorshire have been much improved in quality of late years. The Herefordshire breed being found to thrive and come to perfection on the most fertile farms, and to improve the brindled kinds of the more elevated parts. Great numbers are reared annually, and large droves go off from our fairs for Oxfordshire, Northampton, Leicester, and Romney Marsh, &c. The cattle killed in the country weigh from 6 to 12 and 14 score a quarter, in the lower parts; and from 5 to 9 score in more elevated tracts of the county."—*T. F. L.*

"The breed of neat cattle in the hilly parts of Radnorshire, is superior to that of most of the mountainous tracts of South Wales. The general colour red, and of the brindled kind. The native black small breed is mostly out, in consequence of a mixture with that of Hereford and Salop. The Hereford breed, it is true, always dwindle away and grow smaller, in proportion as it is carried higher into the mountainous part of this county.

"That, mixed with the Hereford breed, does very well on the sides of the Wye, and the lower parts, where the land is tolerably well cultivated: they are, however, even there, not only much inferior in size, but, in general, want the *bald face*, the true characteristic mark of a Herefordshire ox."—*Mr. Clark.*

If by a *bald face*, Mr. Clark meant a *white face*, he was certainly wrong; and we lament that Mr. Lawrence should have transcribed this error into his excellent Treatise on Cattle. The Vales of the Usk, Wye, Somergild, Lug, Tame, &c. shine with the white faces of the breed of the Hereford Cross: and we believe it will be allowed, that in every dairy where a
true

True Hereford bull is introduced, whether in the county of Brecon, Radnor, Montgomery, or Salop, whatever may be the faces of the dams, the calves, from one in two, to two in every three, will have the faces of the sire.

White-faced cattle have now invaded the Vale of Usk, and its various ramifications, up as far as Tre-castle, where the native blacks make a stand against their further progress : and in the Vale of Wye, they reach up as far as the wilds of Irvon in Buallt.

Radnorshire has from time immemorial been noted for the number and excellence of its cattle ; and when we consider the quality of the grass and hay they have to subsist upon, in the wet and rosy interiors of the county, the hardiness of the breed as well as the management of the farmer, must rise in our estimation. Here, the farmer's first care is not to overstock, so that he may have plenty of food, winter and summer, however coarse it may be ; and the cattle, always accus-

pear to be within a week or a fortnight of calving, they will sell readier and higher. The red heifer, with a dark or smoky face, is most in request;—then the white faced*;—then the brindled, &c.; but the colour is not so much regarded if the form be fine, head, neck, limbs, a fine yellow horn, and a lively good-natured eye, with a mellow skin. A handsome *little* heifer always sells readier and higher than one much larger, but of a coarse make. A sour eye commonly accompanies a pendulous dewlap: these remain the last in the market.

Dairy.—"The *Pembrokeshire* cow is coal black, except now and then a dark brown, and sometimes a white face, or a white list along the back, makes its appearance: she is fine boned, with a clean light neck and head, small yellow horns inclining upwards, good chine and loin, round long barrel, thin thigh, and short light leg. She is always in good condition, if tolerably kept, and has a rich wave in her hair, and an oiliness of skin, which ever denotes thriftiness of kind. This sort of cow is to be met in all such parts of *Pembrokeshire*, as are not impoverished by excessive tillage, and where tolerable care has been taken in the choice of bulls.

"It is a general remark in this county, that our cows are not so productive to the *dairy* as those of

* A few years back, the white-faced or Hereford cross, were more in request than the smoky faced, or old breed: but dairy-women began soon to complain, that "too much *soap* had come into the country;" i. e. too many white faces and too little milk: since then the smoky-faced became again the ton, and will probably retain their pre-eminence for ages.

many

any other parts. The mixed kind of farming, which is almost every where practised, makes it difficult to ascertain a general average of the produce of cheese from each cow, owing to a considerable portion of the skim-milk being used in the families. Of butter, some make 7lb. per cow per week through the dry season, from the middle of May to the middle of October; but this is only done in our best pasture lands, and in a few instances. I believe 5lb. may be taken as a fair average for the whole county; and perhaps this is rather more than the truth."—*Mr. Has-*

Cardiganshire.—"All our farmers keep cows for purposes of breeding, making butter, and skimmed-milk cheese. A cow is commonly supposed to fill a cask of butter, weighing about 80lbs. and double that quantity of cheese. The butter is salted, and sent to Bristol; the cheese remains for home consumption."—

3. " From six to seven score pounds of butter is the average produce of a kindly black cow, from May to Michaelmas, on pasture of a medium quality."—*Castle-Howel*.

Quantity of milk, from eight to twelve quarts morning and evening. Small cows near Lledrod gave seven quarts three times a day.

The iron-works of Glamorgan and Monmouth, are weekly supplied with butter in casks from Cardiganshire, by means of higlers.

Caermarthenshire.—" Casks of butter are generally about 100 lbs. which is the average quantity made from each cow in profit, in the Vale of Towy: price of such casks, with willow hoops, about 2s. 6d. each,

" Much butter is yearly sent out of the county; our markets are Bristol and Merthyr Tudful: all the skim cheese is consumed at home: average produce of a cow, 6l."—*Llandovery*.

" A dairy of 30 cows, on a farm partly vale and partly sideland, in three seasons produced four tons of skim cheese, sold at 4½d. per pound, and three tons of butter, sold for 10½d.: this is about 6l. per cow per year, exclusive of the maintenance of a large family, in butter, cream, milk, and cheese; rearing 20 calves, besides the profits of the store hogs."

A pasture piece of 14 acres, advantageously situated, in a curve of the river Towy, for retaining a rich deposition during floods, is a kind of lottery to the occupier: if the Towy overflows its banks in winter or early in spring, the piece is richly manured for the following season; but a summer flood makes a serious drawback. One lucky year, the cows depastured on this piece alone, produced 140 pound's worth of butter,
besides

CATTLE.

des 63 pound's worth of skim cheese, for sale; exclusive of maintenance from the dairy to a family of five persons. The rent per acre was 5*l.*; the produce that year 14*l.* 10*s.*; gross profit 133*l.* The woad ceases on one point, and attaches to another, when it is told that the 14 acres maintained 30 cows from May to October, during which period the above quantities of butter and cheese were made. The butter was that year as low as 8*d.* per pound: by which it appears that the average produce of the cows was 140 pounds each; and cheese, rating it at 4*d.* a pound, 140 pounds from each cow. The following year, a farmer's flood, by taking possession of the grass, made for the third year, &c.; so that for the tenant, it was precisely a game of "*loss or gain.*"

Caermarthenshire includes cattle of several varieties: the black Pembrokes in greater celebrity than any other: the brown Devons in high repute: the native

The butter from Glamorgan goes to Bristol, and to its own home manufactories; from Brecon, to the adjoining iron-works, and by the canal to Newport, &c. from Radnor, to Leominster, &c.

The former large dairies of the Vale of Glamorgan, are now much reduced, owing to the great increase of tillage: only three cows on a farm of 200*l.* rent; and six cows on a farm of 340 acres, &c. Some still milk from 30 to 40 cows.

“The flag lias tract, in the eastern part of the Vale, affords the finest milk, and mildest cheese, similar to the Gloucester, fine cream, and excellent butter. It has also the finest, heaviest, and whitest Lammas-wheat, and good crops; fine oats and beans; but cattle thereon are smaller than on the rag, or grey lias tract.”—*E. W.*

When the cream, by repeated skimmings from milk, is of a sufficient quantity, the butter is separated from the serous and watery parts by the operation of *churning*. Several nick-nack churns have their day; but two kinds maintain a more general permanency: 1. The old vertical, or truncated cone-churn; and 2. The barrel-churn, with pivots at each end, turning vertically upon a frame: the former is the most general; the latter is used mostly in large dairies, as it is less laborious.

Good Butter.—“The best butter is made in the months of June, September, and October: there is a crudeness in May butter, that is unsavoury, and it sooner gets rancid: July and August are too warm, in general: winter-food is too husky; and winter green fodder, though it improves, never gives the best butter;

CATTLE.

of green fodder, vetches are the best."—Mr. T. ssall.

Cheese.—The Britons probably learnt the process of cheese-making from the Romans*; the Welsh term, *caws*, the Irish *caise*, implies it. The Welsh *ymenyn*, Cornish *manyn*, and the Armorican *amanen*, are quite independent of the Roman *butyrum*, or the Greek *boutyron*, which seems to have been used by them more as a medicinal liquid, than an article of ordinary utility.

The cheese of South Wales is mostly for home use, made from skimmed-milk. The agent in curdling warmed milk consists of various preparations of oxes' maws, called by the Welsh *cywair* (rennet). In most parts the mawskins are prepared by the farmers: cleaned, but not washed with water, salted, and dried upon a twig bent in the shape of a paper

"When the farmer keeps sheep, the ewes' milk is added to the cheese, to give it tartness, which the country people prefer to the milder sort."—*Mr. Lloyd, in Cardiganshire.*

Ewes are also milked for the dairy, in several parts of Pembrokeshire, in Gower, in the Vale of Glamorgan, &c.

"In the Vale, many depend more for cheese, upon the ewe, than the cow: the cow's milk is very much wasted, in being given to servants instead of small beer. The soil affords most excellent sheep-pastures; the milk of the ewe is nearly equal in richness, to the cream of the cow; and in cheese-making, the milk of five ewes is considered equal to that of one cow."—*Mr. Gale.*

In Cardiganshire, the milk of from eight to ten ewes is deemed equal to that of one cow; the proportion between cows' and ewes' milk in each county, varying according to their respective native breeds of each sort.—*Castle Howel.*

We do not know that the art of making good palatable cheese is either practised or understood *generally* in any extensive tract of Wales, excepting in the eastern parts of Denbighshire and Flintshire, adjoining Cheshire; and in the eastern part of Montgomeryshire, adjoining Shropshire: the eastern parts of Radnor, Brecon, and Glamorgan, may be similarly circumstanced, owing to their contiguity to Shropshire and Gloucestershire: but after all, our western countrymen may say that "their own tart cheese pleases their palates best;" if so, all reasoning upon the subject will be "*labour in vain.*"

In some parts of West Wales, the milk is kept too old, in order to make a *large* cheese, once in four or

CATTLE.

days; the curds of several days are preserved to be used to the fresh, in order to be made into one cheese: the cheeses weigh, according to the season and the number of cows, from 20lb. to 130lb. Another apparent error is too much rennet, and that applied to the milk too warm a state: skewers of wood, &c. are never used to facilitate the egress of the whey, when the cheese is under the press: and in some parts, the cheeses being immersed from under the press into hot water, become, owing to some or all of these operations, tumefied and case-hardened, that, according to Comfield's description of Suffolk cheese, they are too large to swallow, and too hard to bite." "*Cynhed ag asglodyn*."—*Mr. Lewis Morris*.

The dairy-maid should study the quantity of rennet to be applied; so that it be sufficient to curdle well the milk, and no more: the temperature of the milk, when rennet is applied, is also a main point of considera-

discrimination, more cheese is ruined on warm than cold soils; as the coagulation is brought on too rapidly.

"The skimmed milk of two days warmed, with the next morning's milk warm from the cow, make a cheese; the curd rubbed dry, and as small as possible between the hands, rubbing in salt at the same time; then vat and press it for three, four, five, or six days: from four to nine inches thick, and from 30 lb. to 80 lb. per cheese. The tartness of our country cheese is owing to the curd of one day being kept, to add to that of the second day: make the cheese of one day's curd only, vat immediately, and it will be mild."—*Vale of Teivy.*

Glamorgan Cheese.—"To the morning's milk when it is brought in from the field, add the former evening's milk, and both together warmed to the temperature of milk fresh from the cow; to this add the infusion of the vell, or rennet, prepared the evening before: break, collect, vat, and press. These cheeses are made nearly, and often quite so thin as the Gloucesters; without any colouring.

"The country people are not fond of colouring, but rather averse from it. Some that send their cows' milk cheese to Bristol, &c. colour it, which is of great help to the sale of ordinary cheese; as it renders unknown to the public that peculiarity of natural colour that the best cheese, unstained with anatto always has, and which cannot be counterfeited exactly.

"When the curds of one day is kept, to be broken and mixed with the fresh curds of the following day, it is always kept covered with cold water.

"Ewes are milked for cheese, from the first of May

CATTLE.

he 20th of August, twice a day; from thence to the
n of September they are milked only once, and that
he morning.

All breeders of cattle give the cows' milk to the
wes, during the whole or the greatest part of May;
this reason, in several instances, cheese of ewes'
k only is made.

Put one-third of the milk in a tin, and immerse it
boiling water, so that it make the other two-thirds
-warm, as they term it, then proceed in the usual
hod of making cows' milk cheese; excepting that
curd of the ewes' milk should not be broken so small
hat of cows' milk.

When the skimmed milk of cows can be spared,
that of the foregoing day to the ewes' milk: some
m the skim milk, others prefer immersing it in hot
er, saying that the latter method prevents rankness.
e cheese most esteemed of the country people in
eral, is that of ewes and cows' milk together; the

elsewhere; some ascribe this quality to the abundance of white and red clover in the natural pastures*.

“ Butter-milk cheese (*caws sŵr*) is sometimes made to be eaten fresh with bread and butter: most of the natives are fond of it.—*E. W.*

Dairy Pastures—“ Abounding with white clover, as limestone soils generally are, will not produce fat cheese of good quality: but many think the cheese from white clover, the finest flavoured of any, though not so fat as that from coarser pastures, from which it is known by experience the fattest cheese is made. We have an old adage in Glamorgan—

“ *Meillion gwynion a dawl gaws glas*
Ac oni bydd yn fwyn bras
Bydd yn ddiffael yn oreu ei flas.”

“ *Brithdir*, such as the clayey soils of the flag-lías tract, are very productive of cheese and butter: “*brithdir i fuwch a chrasdir i ddafad*; i. e. rushy, strong soil for the cow, and a sharp dry soil for the ewe.

“ *Pa arwa fo’r tir, goreu’r eullyn;*

and

“ *Gweunydd garw—menyn goren,”*

are adages well known in Cardiganshire, &c.”—*E. W.*

On farms having varieties of soils, old and coarse pastures producing the *scabiosa succisa*, devil’s bit (*y benlas*), the *centaurea nigra*, common knapweed (*y bengaled*), &c. commonly produce milk in abundance, and that fertile in curd. These soils are more

* May not this brittleness be prevented by a different temperature in the milk when the rennet is applied, and other management of the dairy-maid. The size of the cheese should be adapted to the quantity of milk, so as not to keep milk and curd too long, in waiting for more.—*D.*

CATTLE.

ular to the coal and shale tracts, indicative of a stratum of clay; and providentially make some ends for their deficiencies in other respects.

Peculiarity of soils and grasses has a greater effect on the quantity than the quality of cheese; its quality depending almost entirely on the management of dairy-maid.

Mr. Johnes of Hafod, always active in rural improvements, has refuted the erroneous notion, that varieties of cheese could not be made on the same land: he has proved, that at Hafod, cheese may be made at home, so nearly resembling Parmesan, Stilton, Gloucester, or Cheshire, that the difference cannot be perceived by good judges; and that the whole mystery consists in various modes of producing it from the same milk. Two receipts for Hafod toasting-cheese, are inserted in the *Agricultural Magazine*, No. 47, p. 398.

Weaning of Calves, and rearing of Stock.—After

The farmer adapts, as much as in him lieth, the calving season to the object which he has in view; whether dairying or breeding; if the former, he prefers calves brought in March or April, so that the cows be in full profit when they are turned out to grass; if the latter, winter or early spring calves are desirable, as they improve much more during the following winter, for which the farmer forfeits some dairy profit.

"Calves are weaned in from a fortnight to a month old; then they have skimmed milk: hay and linseed tea very seldom used: some use infusion of elm leaves: calves for oxen are castrated in June, sometimes in July."—*Glamorgan, limestone tract.*

"Calves are off the cows about a week old, and fed with new milk fresh from the cows for a month or six weeks, some only for about nine days; then on skimmed milk and infusion of linseed mixed; the seed bought from Bristol, the want of flax-dressers in the country being an obstacle to its cultivation; then hay-tea: the males are gelded when a month or six weeks old."—*Mr. Thomas, west of Ogmore.*

"Calves are weaned from their dams a month old, and then fed on skimmed milk for two or three months more: linseed-tea, and culture of flax, unknown."—*Glamorgan, coal tract.*

"On this farm I rear twenty calves yearly. We prefer winter-calves, and contrive to begin rearing from November to December: they are gelded and splayed, if strong, at a week or nine days old: they are weaned at four or five weeks old, and thence forward have a gruel of milk and water: no preparations of hay or linseed."—*Vale of Towy.*

"I am a native of the Vale of Towy; and when I removed into this cold region (*Buallt in Brecknockshire*)

shire) I found their management of cattle much superior to that of my own country: by following the example, I have brought my stock of Caermarthens into a much better plight than their kindred race on the richer soil, and in the milder air, of the Vale of Towy: *there*, they are too negligent at the starting, I mean the rearing of calves: and afterwards the stock is stinted by having too much straw without turnips; *here*, and in the similar and adjoining tract of Radnorshire, the maxim is not to over-stock, but provide plenty of food winter and summer; though it be coarse, yet plenty: by plenty I mean, not too much at once in winter, but a little at a time, and that frequent; with good littering and attendance. Turnips the first winter, will set the beast a growing, by rendering him more hideloose than he otherwise would have been."—*Mr. Saunders.*

"The time of weaning depends, in some degree, on the time when the farmer wishes the dam to take bull; if soon, the calf is taken off the cow in a week or nine days, and suckled by the hand with new-milk, for three, four, or five weeks. The sooner calves are weaned, the more tractable they are when a change of diet, to gruel, &c. takes place. Some put a quantity of oatmeal in the gruel, and most add to the gruel, a mucilage made by simmering linseed in water over a slow fire until it becomes a perfect jelly; this is very nutritious, and dairy-women are anxious that flax should be sown in a headland, or garden, every year for the purpose. With this gruel, once or twice a day, dry-kneaded pellets of barley, pease, or bean-meal are given. Vetches ground into meal, improve the quality of the paste. Closes of appropriate size are preserved for the calves, the soil should be sound, and the

the herbage sweet; after harvest, stubbles are preferable to aftermaths."—*Radnorshire*.

It was a sage observation of an old farmer, that much of the breed of a horse, or a beast, goes in at the mouth." Twin calves of the same size and constitution, one reared by A, the other by B, may make a very different figure when exposed to sale at three or four years old.

Diseases of Cattle.—"Cattle are found to be more healthy foddered out in the open fields, than in houses or yards; and diseases of cattle, complained of elsewhere, are almost unknown in the Vale of Glamorgan.—*E. W.*

"The *flux* is not an uncommon disorder: the farriers give dragon's blood, and bole (Armenian) boiled in stale urine, for three doses every alternate morning."—*Glamorganshire, coal tract*.

"The *flux* is rather common; some lives lost; cured by turnips, in autumn: cathartics, given sometimes, to carry off the offending cause, we apprehend, are more effectual than absorbents, such as the solar earths, which are now deservedly discarded from the list of medicines, and used only as coarse pigments."—*West of Ogmore*.

"A *cough* in calves, called in some parts *whisk*, is supposed to be caused by an insect, or its egg, taken from the tops of bent grasses, in July or August: they are drenched with an infusion of asafœtida, in small beer; with diluted oil of turpentine, put down their nostrils: this is a successful remedy."—*West Wales*.

"The *bloody murrain* (*y clwy, y clwy byrr, &c.*) has been fatal in Cardigan Upper, during some autumns: the tenant at Aber-Maid, lost 15 head in the
autumn

autumn of 1805: it seizes all kinds and ages, and is equally mortal to all: no remedy known."—*Gogerdm.*

"This disorder is called in Glamorgan, *blackleg*; and is considered here, to be owing to the mismanagement of the farmer, to the irregularity of food, &c. autumn is the common season of attack; barley-stubbles and turnips, are considered as the best preventives."—*West of Ogm.*

Red-water, a disease so named, is of two kinds; one attended with costiveness, the other not. The latter affects delicate constitutions, especially in autumn, when frosty nights commence; and when the patient is bled, the urine recovers its colour; but cows once affected by it, will be more or less subject to a relapse, upon similar occasions. In some mild cases, there is no danger; a cow affected this way, often fattens the best: in others, if it be the same disorder, pure blood apparently is avoided; and, without remedy, it ends

Improvement of Stock, Crossing, introduction of New Breeds, &c.

Pembrokeshire.—"If our breed of cattle can be improved by any mixture from other counties, it is evident we stand in need of such improvement in the article of *milk only*; and it seems to be an important object to effect; but great care must be taken to avoid a heavy sluggish mixture. If any light active breed, noted for producing a large quantity of rich milk, were cast into our stock, I see no reason why any danger should be apprehended from the mixture; and no doubt but the better sort of our farmers would readily try the experiment: perhaps the introduction of a few heifers, may take better than that of bulls.

"An attempt was made about fifty years ago, to improve the breed of cattle in this county; but however laudable the intentions of the gentlemen who made that attempt were, they certainly mistook the means of improvement, by going for an increase of weight in hide and bone; for which purpose, they purchased, at monstrous prices, the old heavy Leicestershire kind. These cattle, crossed with ours, made them sluggish and unfit for labour; slow in feeding, coarse in their beef, and altogether ill calculated for stocking this county. By this fatal error, our farmers became more than ever attached to their own breed, and prejudiced against every thing that bore the name of *English*.

"Notwithstanding the impression made upon the minds of our farmers by the failure of the attempt just mentioned, which is still kept in memory throughout the county, we have a sufficient number of intelligent men, who will not suffer prejudice to overcome their under-

CATTLE.

standing; and who will, I am confident, gladly
well considered plan for improving the *dairy*
provided it can be done without the risk of
the valuable qualities our cattle possess in other
s. The cross with the Ayrshire Scots cow is
likely to answer. See the Surveys of the Coun-
Ayr and Renfrew, for an account of this breed."

Hassall.

Some of the Scottish breeds are in high repute for
but a gentleman farmer informs me, that *all*
afford more milk in the northern than in the
n parts of this island; so that any trial of a
with the Ayrshire, or any other northern breed,
possibly end in disappointment: of this however
not be certain. It is, however, well known, that
ther south we go, the less in quantity we find
lk: in France it is less than in England: in
cows yield not so much milk as in France; and
occo, the quantity of milk is still less. Sup-

often crossed with the stunted blacks of the adjoining parts of Caermarthenshire, and others. The most likely place to find pure bulls and heifers, is in some parts of Gower: we have found them, however, perfectly unmixed in the Valleys of Neath, Tawy, &c. The Gower reds are by some supposed to be the same as the Devon: but this may be doubted; they are however considerably similar: but the frequent white face in the Glamorgan reds, indicates a lineage collateral with the Herefords; or of the same original stock in part, perhaps in the whole, if attention to improvement, and superiority of general keep, be the reason why the Herefords are so much larger than the Gower breed."—*E. IV.*

Without incurring, it is hoped, the reprehension due to the currier in the fable, who advised that the besieged city should be fortified with leather, the writer of this paragraph begs leave to recommend the Montgomeryshire red heifers, with dark-smoky faces, to the notice of the Pembrokeshire breeder. They shew more blood than any breed of cattle in North Wales; and are, in general, good milchers. Their colour also recommends them, being frequently of a dark reddish brown, without any white excepting the appendages, and commonly a list from the udder to the navel. The horns, never standing wide, nor turning upwards, are fine, and remarkably yellow, a supposed indication of rich milk. This colour, probably, would not materially affect that of the native Pembrokes, which is an essential point, as long as the drovers coming into that county will buy no other than blacks, excepting at inferior prices; which indeed, is the case in every county where there is a peculiarity of breed, be the general colour what it may.

Caermar-

Caermarthen and Cardigan.—Several breeds have now and then been introduced upon the best soils of these counties; but the Pembrokes have the decided preference, especially in the Vales of the Towy and the Teivy. The Hereford cross pushes up through Brecknockshire into the Vale of Towy, about Llandovery, Llan Gadock, &c.: both these introductions improve the native stock for the shambles, but not for milk: this is still a desideratum; and whatever suggestions have been given for the improvement of the Pembrokeshire breed in this respect, refer equally to its kindred, and perhaps parent stock in these counties.

Glamorgan.—"Crosses have been tried of the Glamorgan breed with those of Hereford, Devon, Stafford, Lincoln, Pembroke; but in every instance known, without benefit equal to the trouble."—*Mr. Morgan.*

"The size of cattle should always be in proportion to the means of support. Were cattle brought from the Netherlands into our coal tract, Nature, by endeavouring to produce the species in their original native size, would reduce them to a shape as much like camels as oxen."—*Mr. Thomas, west of Ogmore.*

Every spot of soil, connected with its peculiar degree of climature, originally framed a species of stock suited to itself. Improved breeds, as they are termed, may be introduced there, from situations widely different; but it will be found that Nature will finally prevail in reducing them to its own standard. Soils, it is true, may in a considerable degree be improved; but climature is next to unchangeable, and unchangeable will be its effects.

In viewing the Glamorgan cattle, one cannot help observing, that it is a breed well adapted to be improved
in

in itself, without crossing. Some are very handsome : but we seldom see a dairy of cows without several of them being deficient in symmetry ; indeed, more are so than otherwise. On our observing, to a very intelligent farmer and breeder, that greater care ought to be taken in always selecting the most perfect specimens, males and females, for breeders ; and all that are not so, should be condemned to celibacy and the shambles : he replied, “ that he had paid the greatest attention possible to that point for many years ; but that he had frequently been balked in his expectations, by the progeny of selected pairs turning out very differently, some handsome, and others not so : an ugly cow occasionally produces a beautiful calf ; and a handsome cow, the reverse : we see this, added he, by analogy, in other animals, even among the lords of the creation. It, however, appears, that attention will bring about a thorough reformation in certain breeds of cattle sooner than in others ; this may be owing to their being nearer perfection at the outset. The more uniform symmetry of the present stocks of Herefords and Devons, we may consider as the effect of the attention of ages ; though it be but of late that they have attracted so much of public notice. Though I have hitherto failed in procuring a stock according to my ideas of perfection, yet I do not despair, because I think it practicable, by unremitting attention, and perseverance, without crossing ; and when it will be so acquired, it will be more valuable, because more permanent ; and more permanent, because more natural.”—*T.*

“ If more care in selecting be bestowed on one side than the other, let it be on the side of dams, rather than sires.”—*Glamorgan.*

It is pretty generally allowed, that the offspring of all
 1. WALES. VOL. II.] R animals,

CATTLE.

nals, seven times in ten, resemble their dams more than their sires."—*Vale of Usk*.

Improve the stock in itself, or the same breed, rather than cross; improvement will be more permanent on that account."—*Vale of Teivy*.

The neatness of form, energy and vigour in labour, especially, if not wholly in this breed, (North Devon) is derived from breeding by heifers, and year-old and two-year-old bulls."—*Lord Somerville*.

Brecon and Radnor.—The cross which produced the present white-faced cattle of these counties, is the Hereford. On the boundaries of England they must be equal to those of the parent stock; and diminish in quality in proportion to the scale of climature, in approaching the mountains.

Radnor Lower.—"Our cattle of the Herefordshire are equal to their kindred in their native county."

neither of them good milchers, the Herefords best of the two ; but the Shropshire are better than either."—*Mr. Prichard.*

SECT. II.—SHEEP.

THIS most useful species of domestic animals within this district, may be divided into *four classes* :

1. *Mountaineers*, occupying the hills in the several counties of the district. There is very little attention paid to this class ; neither is it easily practicable, owing to the general commonage of pasture. The ewes and wedders are some horned, and more polled ; the rams naturally become horned ; and horns are useful to keep off intruders upon their accustomed walks with greater effect : half a dozen New Leicester, or other polled rams, would not willingly engage a second time one horned mountaineer, as they are such sturdy opposers of invasion. They have, generally, white faces and legs ; those of a different colour have acquired it by crossing. Their wool is of the short kind, but longer in proportion to its coarseness ; its fineness depending on the soil, climature, and aspect of the walks ; it is used in flannels, blankets, ordinary cloths, and felt hats ; and sells at various prices, according to quality and demand, from 1s. to 20d. per pound avoirdupois ; the fleece weighing from 1 lb. to 2½ lb. &c.

The average weight of mutton per quarter, in this class, is from 6 lb. to 9 lb. in ewes ; and from 8 lb. to 10 lb. in wedders, fed in their own country : some select flocks weigh considerably more.

Cardiganshire.—This county has been long noted

SHEEP.

s profitable stock of mountain sheep; on the borders of Montgomeryshire at Pumlumon; and on the borders of Radnorshire and Brecknockshire, on the backbone of the mountainous tract of Dimetia. The geographer of Wales, says of the sheep of this country—

——“*defaid caledion beunydd,
Sydd ym mhob cwr o'r môr i'r mynydd;
Maent hwy 'n fuddiol iawn i feddu,
I'r sawl a'u pryno yn oreu yng Nghymru;*”

“Sheep of the hardest kind, in every part from sea to the mountains: they turn out very profitable to buyers; the best of any in Wales.”

Whether these lines, printed about the year 1720, describe the Cardiganshire sheep better known; or whether they have any intrinsic excellence superior to their brethren in other parts, we know not: but it still appears they are more eagerly sought after than any mountain-breed in Wales. Wedders are bought for the

The *Job of the West*, the proprietor of the greatest number of sheep in Wales, a few years back, lived in this county. Mr. Williams of Pant y Siri, near Tre Garon, was possessed of about twenty thousand sheep, five hundred wild horses, besides a vast number of wild cattle. He monopolized the whole range of hills for his numerous flocks: his shepherds kept them during summer on the summits of the mountains, even in Brecknockshire; and the skirts of the immense walks were scrupulously preserved, to collect fog during summer and autumn, for his numerous flocks in winter. He was so purse-prond, that in answer to his landlord, who threatened him with an action for certain damages done to his farm, he is said to have replied—"You may begin as soon as you please; I will maintain a seven years law-suit with only the breechings of my sheep's wool*."

On Mr. Williams's death, his property being divided, &c. the greatest number of sheep in the possession of one person is now, on an adjoining walk, in

Brecknockshire.—"Notwithstanding the distance from markets, the badness of the roads, and the inclemency of the climate during the greatest part of the year, a gentleman of the name of Jones, possessed of considerable property, real and personal, and a magistrate in the commission of the peace for the county, has built a handsome house at Llwyn Derw, in the parish of Llanddewi Aber Gwessyn, where he resides, and pays his attention principally to *rearing sheep*, of

* Alas, poor man!—he knew the size and capacity of the shears of his shepherds, better than he did those of the craft he intended to employ for seven years!

SHEEP.

he is supposed to be the greatest proprietor in Wales: he is said to have upwards of ten thousand upon an average ten or twelve shillings

The Leicestershire farmer will smile at the individual value of each of these diminutive animals; let him introduce his rank; overgrown stock, to mountains, and see what his profit will amount to the end of the year."—*Mr. Theo. Jones.*

Most of the scenes, in the harmonious pastorals of "sweet Swan of Ystrad Meyrig," are within these extensive sheep-walks: and James Howel, the eccentric writer of *Epistolæ Hoelianeæ*, &c. was born in the neighbouring wilds of Llangammarch, about the middle of the 16th century*.

There are a number of gentlemen sheep-farmers in the hundred of Buallt; and most of the money made by sheep-farmers, has been by sheep. The number kept will depend upon the farmer's capital in money to stock

the "sheep farmers" of this county and Radnor. "The profits arising from the sheep upon these extensive commons, enable the farmers to live without paying *scarcely* any attention to the improvement of their farms: in general, they send for most of their corn to the next market towns."—*Brecon*, p. 34.

In paying attention to sheep, unless winters be uncommonly severe, they derive certain profit; they supply the public with great quantities of mutton for food, and wool for the manufactures: were they to act otherwise, or according to Mr. Clark's theory, and apply to tillage where nature never designed it, to the diminution of their fleecy flocks, their expenses would never be returned; they would still be buying corn, and that without the means they now enjoy.

Caermarthenshire—Claims to be ranked among the rearers of this hardy race. The extensive range of hills between the Teivy and the Towy, supports very numerous flocks.

"Defaid lawer sydd yn bendant,
"O amgylch Ystrad Ffin a Phumsant,"

says our Topographer in 1720; and the sheep of the tract mentioned by him, are still in good repute.

Some particular tracts, affording dry banks for lodgings, and sufficiently extensive and grassy, will naturally produce sheep superior to those of other tracts not so well circumstanced. This attracted the notice of buyers; and this again caused greater attention in the breeders of those tracts, who annually dispose of the cullings of their lambs and yearlings, and rear for wedders only the most promising. Such at present are the sheep of Pumlumon, Lledrod, &c. in Cardiganshire; of Ystrad Ffin, Pumsaint, &c. in Caermarthenshire;

SHEEP.

hire; of Devynock in the red sandstone tract; of
and Vellte, in the middle limestone range, &c.

Pembrokeshire, this race inhabits the Perselly

the mountains we have hitherto treated of as sheep-
s, are all in the shale or slate tract, cold and
; and the wool, like the grasses the sheep feed
, more or less coarse.

imilar to these mountains, though not quite so ele-
, are those of the coal tract; and similar are the
that graze upon them. Parts of the coal tract
st of dry healthy downs, of sandy soils formed
the *debris* of the coal measures: these are clothed
finer herbage, and stocked with finer sheep accord-
; such are the downs of Garth, Eglwys Ilan,
n Glamorgan.

move sheep from the colder soils of the coal and
tracts, into those of another description on the red
stone, and especially on the limestone tract, were it

handsome: the lambs, well kept, are among the most symmetrically beautiful animals in the creation; lively and active in the extreme: their subsequent deformity must be owing to scantiness of food, especially during the first year. Mr. Malkin, in his Tour of South Wales, seeing a sheep-washing in C. n. Elain, exclaims with rapture; "I was much struck with the difference between the hilly sheep and those of the Vale. The former are not only smaller, but infinitely more elegant and picturesque in figure. They seemed to have all their wits about them; so that one would think, the race had acquired its proverbial character of silliness, by fattening on rich and artificial pastures, without having inherited it originally in the state of nature." Vol. I. p. 471.

We may be certain that the celebrated philosopher, Buffon, did not form his silly opinions, in his Natural History of the Sheep, from his observations on this breed of mountaineers; but rather on the gouty feet and the idiotic eye of the pampered race, deformed and degenerated by the ingenuity of man.

In many parts of Cardiganshire and Pembrokeshire, landlords discourage the rearing of the native breed of sheep, being of a wild nature, and not easily confined within any fences of reasonable expense; breaking continually into turnips, clover, plantations, injuring quickset fences, &c. : so that in such parts, the flocks of most farmers are but small, and many of them have none. These sheep are known to have gone as foraging parties in the night, and fed themselves during the night on turnips or clover, and sagaciously retired again, of their own accord, about day-break. Could Buffon have done more, in their situation, and pinched with hunger?

Out

SHEEP.

Out of their proper situations, the extensive mountain walks, these sheep are considered by most landlords, in all the counties, as vermin; profitable only on one side of the ledger; but on the other totally prohibiting improvements in tillage.

2. *Glamorgan Vale Sheep*.—This is the only breed in Wales not introduced within memory of man, and produces combing wool: its staple is about five inches, very white, combs well, spins and works well into strong flannels, blankets, &c. for home wear, which in this country are much more used than linen, even in the peasantry. They are said to be generally finer than the Somerset Natts, though compared to them, and supposed to have sprung from the same original stock. They are subject to very few diseases, and those but seldom. Time of yearning from Christmas to Candlemas; lambs weaned the beginning of April; and the ewes milked all summer: at the begin-

“ These sheep feeding on limestone pastures, their mutton is fine-grained, tender, and richly flavoured. Of a large variety, they are the nearest in resemblance to the New Leicesters of any breed we know; having clean and fine heads and limbs; with round lively eyes, very different from the silly looks and oblique angled eyes of some modern imported breeds: they are moreover gentle, and easily kept within fences. Two lambs at a yearning are common, sometimes three.”—*E. H.*

“ The rot, and many other disorders incident to sheep in other parts, are unknown in this Vale. Our weaning the lambs so young, for the sake of milking the dams, injures the breed, and should be abandoned. Folding should be substituted instead of milking; and folding, well managed, would not injure the flock. Our pastures being so excellently adapted for sheep, we keep too few; only from 50 to 70 ewes upon a farm of 200 or 300 acres: one herd would attend well, and fold 500 sheep. Lambs about Midsummer sell from 24s. to 27s. each; ewes just before yearning from 3l. 18s. to 4l. 6s. each; grown wethers from 3l. to 3l. 10s.”—*Mr. Gale.*

“ Mr. Gale, being a native of the folding district of Gloucestershire or Wiltshire, is prepossessed in favour of folding, which in my opinion encourages the scab, &c.; and milking ewes is one of the best practices of the Vale of Glamorgan, as it greatly augments the quantity, and improves the quality of cheese. Our sheep are smaller, west of Ogmore, from 18 to 20lb. a quarter; and fleeces from three to four pounds each, worth about 17d. per lb.”—*Mr. Thomas.*

3. *Glamorgan Down Sheep.*—“ This is a beautiful and excellent small breed; occupying the open downs

SHEEP.

ns of St. Mary Hill, Golden Mile, Newton Down,
in the Vale of Glamorgan; and Cefn y Bryn,
illy Down, &c. in Gower. Feeding upon the
st and sweetest pastures of the limestone tract, their
on is superior in quality to most, and inferior to
; their wool is of the short clothing kind, and fine.
y are generally polled; the few horned that occur,
aid to be owing to occasional intercourse with the
ntaineers of the coal tract, either strayed, or brought
n for commonage of pasture by the less intelligent
ers. Were it not for this distinction, in being less
monly horned, we would pronounce this down
l to have sprung from the mountaineers originally;
that it owes its present superiority of carcass and
, to superior food and milder air. Whether these
umstances, in a thousand or two thousand years,
d have reduced the horns, we leave for the Buffons
Darwins to decide.

Belonging to different persons, under different ma-

roducing various popular breeds, that are, after all, found to be inferior to their own. What precise degree of excellence may be attributed to the Gower and Down sheep, here treated of, cannot yet be determined; but it may be safely said, that they are amongst the *greatly neglected or unknown good breeds*.

“ On the downs some sheep perfectly black occur; another instance of distant affinity with the mountaineers; there are instances of half the ewes in a flock producing twins, and some few year trines: they fatten very soon on grassy wheat and oat stubbles.”—*E. W.*

4. Crossed, and intermixed Breeds.—Pembrokeshire.—The mountaineers of this county, occupying the Percelly range, and other walks in the northern and north-western parts, have been included in the first class.

In the lower parts of the county, the sheep are a cross between the mountaineers and the Cotswolds, Dorsets, South Downs, &c.; mostly without horns; well adapted to the county with respect to the demand of the mutton markets; weighing from 14 to 11 lb. per quarter; good mutton at 18 months old, in perfection at three years; the fleece from 3 to 4 lb. Heavier mutton would not be acceptable in this county; and wool is not here an article of prime importance. Occasional supplies to keep up the stock of the county of Hereford and Gloucester ewes, &c. are brought here by the cattle-drovers, on their return home, at tolerably cheap rates.

“ Our want of a competency of green fodder in winter, makes mutton rather dear in the spring and first summer months; but afterwards the flocks of
mountain

mountain sheep upon the hills become fat, and are sold at our markets at low rates."—*Mr. Hassall*, in 1794.

Mr. Mirehouse, aware of this spring scarcity of mutton in the markets, had the means of supplying them, by always having plenty of turnips in winter, and rape and irrigated pastures in the spring, upon healthy and early limestone soil, so as to fatten his sheep at 18 months old: this he did for years without a rival: at length other persons copied his example in one instance at least, that is, in getting their sheep slaughtered at the same age; so that the markets became filled with what may be termed *premature mutton*. We heard a loud complaint in 1812, that the markets of *Pembroke* and *Haverfordwest*, &c. were supplied in spring, and early in summer, with meat, which, properly speaking, was neither lamb nor mutton. This must be owing to the farmers too generally following *Mr. Mirehouse's* example in one instance only, *without*, on the other hand, providing ample supplies of turnip and rape crops, &c.

The *Hereford Ryelands*, and *South Downs*, unmixed with the native breed, have had a fair trial for many years past; and are found to answer very well.

About *St. David's*, and the western coasts, on the unenclosed pastures surrounded by lands in tillage, sheep are coupled in a kind of yoke which is fastened to one end of a rope from 18 to 30 feet long: the other end of this rope is fastened to a strong stake of wood, or bar of iron, firmly fixed in the ground, at such a distance from the corn that the sheep cannot reach it whilst grazing all around their center, to the whole extent of their rope or tether. It is said that the sheep feed well thus; and much sooner than such as are at large on mountains and other extensive wastes,

or

or even those in enclosures: but thus to thrive, it is said to be necessary that the lambs should be very early tethered in this manner, that this state of life may become habitual to them. Enclosures are daily extending themselves all over this part; and this management of sheep decreases in proportion; but they have none at large. Cattle are also tethered occasionally adjoining corn, in a manner similar to what we have seen in Hertfordshire, &c.

Radnorshire.—This county, of its size, rears more sheep than any other in the district.

The western end of the county is already included in the first class of mountaineers. The interior, and northern side, which contain very extensive walks, have an assemblage of mixtures, some horned and more polled, some with clean white faces, others bunchy cheeked; some with speckled faces, others nearly black; owing to the farmers buying summer yearling stock from all parts, Cardiganshire, the Pamlumon side of Montgomeryshire, &c.

But the more general character of the sheep of this county, is to be found on the Forest of Radnor, and on the sound wastes in the eastern parts. These seem to have been produced by a cross of the mountaineers with the Forest of Clun sheep in the adjoining part of Shropshire. They are fuller fleeced than most breeds, being muffled up to their noses, their legs nearly covered, and their tails resembling those of beavers. The wool has fewer kemps than any mountain breed; and was formerly reckoned the finest in Wales. Our frequently quoted Topographer in 1720, says—

“ O bont y Clás i blwy'r Bugeildy
Y mae'r gwlan rhywiocca yng Nghymru:”

i. e.

SHEEP.

"From Glasbury-bridge (on the Wye) to the parish of Bugeildy (on the borders of Montgomeryshire) is the finest wool in all Wales." The wool of this tract is still of good quality, and in great request in the manufacturing districts of cloths and flannels; in fineness, it holds now only the second rank. When the wool of the red sandstone tract in Brecknockshire, the elevated Brecon beacons, &c. sells for a stone of 15 lb., Radnorshire wool sells for about 30s.; and the long mountain wool in Montgomeryshire, from 35s. to 40s.

The features of this breed are somewhat uncouth: a few sheep turn out more profitable: they are not so restless and mischievous as hill sheep in general; they collect inside fat perhaps beyond any other breed: and 12 lbs. rough fat, are not uncommon; and we are informed, that a Chandler at Knighton once bought the rough fat of a hill wedder weighing 22 lbs. The sheep of this county are in general small,

Miscellaneous Notes on Sheep, Crossing, Diseases, &c.

Crossing is not commonly approved of; as it is, in many instances, an attempt to force Nature against its own fixed and eternal principles. Many experiments have been tried within the district, and most of them confessedly without the expected success. Particular breeds of sheep have their peculiar diseases, which continue in their constitution, wherever they are removed. The limestone tract may be considered as the healthiest for sheep within the district; but even there, the imported modern breeds have brought with them the scab, the foot-rot, the goggles, maggots, and a long train of diseases never heard of before in Wales: these are to be ranked among the profits of commerce.

"We are strangers to the rot and the scab in sheep; and I should be puzzled to calculate the period of their existence, if they were not killed by the butchers, or starved in the spring of the year."—*Mr. Lloyd, Cardig.* p. 9.

Rot is the most destructive of the few maladies with which our native sheep are affected. On the limestone tracts, and on the dry sound portions of all the other tracts, this disease is unknown: on the *wet* parts of the slate and coal tracts, many lives are occasionally lost by it. Some divide it into two kinds; general, and partial. The former is a tabes, or waste, affecting the whole system; the latter is either pulmonic or hepatic, according to its seat in the lungs or the liver. The latter vessel is either schirrous, or affected with the fluke-worm (*fasciola hepatica*). The marsh pennywort, growing on poor wet soils, resembling the fluke-worm in roundness of form, is accused by the peasants of causing the rot, whence its names, white

SHEEP.

(*dail rot*, &c.); and accordingly, some shepherds
re their sheep frequently from soaks where these
nts abound. This is not amiss; for though the
bs may be harmless, yet the wet grounds, whereon
grow, may be more guilty.

The *symptoms* of rot, without distinguishing parti-
r kinds of it, are, a falling off in condition; a
biness of muscle in handling; a cough; pocks, or
cles under the jaws; and a pale yellow colour of
fleshy part, in the inner corner of the eye. Old
s, &c. in parts where the rot is suspected, are never
ght without being minutely examined, as to these
iculars. At marking-time, after shearing, the per-
holding the sheep, at the letting off, opens and
mines the eye, and by the colour, judges whether
animal is to follow the flock as usual, or to be put
he infirmary. The flukes in the liver is rather a
of than a symptom.

The signs and symptoms of rot are more attain-

into their system more moisture than is salutary. Wet lands also produce less variety of eatable grasses, for sheep to feed upon, than dry soils; and those few grasses are moreover less savoury, and perhaps less digestible. The upright gorse with soft branches, broom, wild thyme, wild sutherland, wild basil, bastard baum, and other bitter and aromatic shrubs and plants, supposed to be wholesome for sheep, are natural only to *dry* soils. We know only of one plant natural to *wet* soils, that is said to have a salutary effect upon sheep.

The author of the History of Brecknockshire, (vol. i. p. 527), says—"The marsh trefoil, or bog-bean (*menyanthes trifoliata*) is a plant of unsavoury taste; sound sheep avoid it: when symptoms of rot begin, sheep search for it by instinct, and devour it greedily: where such sheep are depastured, no bog-bean is to be found, for in a week or two they devour it all. I know not that the cultivation of an acre of morassy ground, for the use of unsound sheep, has been recommended by any husbandry writer."

Driving sheep from wet lands into adjoining dry banks, to lodge during night, is scarcely necessary where sheep have their own choice; for they naturally affect such situations; and shepherds say for two reasons, or rather principles of instinct: 1. for a more comfortable bed; 2. for the occupying of a more advantageous exploratory, to guard against the approach of enemies by surprise: the latter instinct is entitled to credit; for on walks of an undulating surface, equally dry in all parts, yet, at the close of day the flock retires to the higher eminences, unless driven by weather to seek better shelter.

The rot, as it might be expected, makes the greatest havoc, where a combination of wetness, in soil and

season, takes place: for the latter there is no remedy; for the former, somewhat may be done, even on sheep-walks, by open furrows with the plough, cutting fuel in the draining direction, &c.

Salt-marshes have been accused of causing rot, though wrongly. Oxwich Marsh, in Gower, when occasionally flooded by the tides, produced the most wholesome sheep-pasture: but since its embankment by the late Mr. Talbot, no sheep could be kept upon it, as they were universally rotten.

The native sheep, especially those accustomed to enclosures, are also occasionally affected by different species of a disease called, in Veterinary science, *braxy*.

1. The *dry braxy*, which, from its almost instantaneously mortal effect, is vulgarly called *planet-struck*, (*gwedi ei daro â phlaned*) is more common in parts where the contrast between heat and cold is greatest: in the more temperate climates it is less frequent: it seems analogous to acute fevers in the human species: the animal dies, greatly distended by morbid gas. Some recommend bleeding sheep of a plethoric habit; as the young, and best in condition, are most subject to fall by this disorder.

2. The *watery braxy*, is supposed by some to be the effect of suppression of urine, caused in some instances by too succulent food, which brings on a dropsy; and from hence called by the peasants *red water*; which appears in great quantity on opening the dead animal. The immediate cause of death is said to be the bursting of the bladder. If the disease be observed in time, puncturing the bladder is recommended in preference to diuretic medicines. The best of the flock suffer most by this species of *braxy* as well as the other. The critical time seems to be
that

that when sheep are turned into better pastures to improve; *i gryffa*, as a farmer expressed himself at Gelli Gaer, in the coal tract: he then cut off part of their tails, to bleed copiously: and dosed them with a spoonful of tar mixed with bruised garlick, as a preventive; especially on taking the flock from the hills into the fields in October, or earlier.

The *flux*, and the *dunt* or *gid*, *sturdy*, or water in the head (*y bendro*) occur but seldom; and are not much thought of.

We heard a complaint among the Brecknockshire and coal tract shepherds, of a species of disease in sheep, unknown to them until within about 20 years back: they called it *snuff*, from its commencing with sneezing in the nostrils, from which, they said, "it proceeded to the brain, and in that case became fatal. This disorder may be attributed to the insect called *oestrus ovis* depositing its eggs, in the same manner as its relation, the *oestrus equi*, occasions the botts in horses; and the species *bovis*, the insects in the backs of cattle. At the commencement of sneezing, an injection into the nostrils, with a syringe, might be of service, by either destroying, or carrying off the larvæ.

Of sheep, foreign to the district, there have been introduced into gentlemen's lawns and parks, and enclosures of farmers, as many varieties as are known in England.

"Glamorgan Vale breed (second class) crossed with the Spanish; fleece of the cross, 10 lb. worth 18*d.* per pound.

"Newton Downs (third class of Welsh sheep) crossed with Old Leicesters—produce of carcass, two-fifths less than the Leicesters, from 20 to 24 lb. per

SHEEP.

er; wool, four fleeces, sometimes three, to the
of 21 lb. sold for 19s."—*Vale of Glamorgan*.
The advantage of crossing long-woolled with short-
ed breeds, does not appear satisfactory: it pro-
duces wool of a mongrel quality, not particularly
suited to either branch of manufacture, cloth or
carpet; and when the wool market is dull, it is
very saleable in Wales.

In the North of Pembrokeshire we found the follow-
ing genealogical chart—Ist, the Old Leicesters crossed
the native Welsh (1st class): 2dly, that cross with
Leicester; then New Leicesters with the second cross;
South Downs with the third: weight of mutton of
best family, 15 lb. per quarter.

A yearling ram of the New Leicesters, at Kil-
mau, gave a fleece of 13½ lb."—*Vale of Teivy*.

A Dorset cross at Newton Park, fine headed and
fleece from 4 to 7 lb. worth 18d. a pound:
carvers from 14 to 20 lb.: inside fat from 7 to 10 lb.

sons sheep; and more so in autumn than spring."—*Llanelly, coal tract.*

"Old Leicesters improve in wool in the Vale of Glamorgan, but diminish in carcass."

"New Leicesters the best outside feeders; and consequently their value easier judged by handling than any other breed."

"Glamorgans, South Downs, and Ryelands, the best for inside fat."

"South Downs the best nurses."—*Vale of Glamorgan.*

"South Downs do very well on the *dry* uplands of Cardiganshire; they are hardy and healthy; but they suit perhaps their own native Downs better than any where else. However, they never do well here on moist soils, or to be fed on succulent plants, turnips, clover, vetches, &c.; for in this humid climature, such food occasions flatulence in them."

"I think a native breed, improved by a judicious selection of ewes and rams, would be the best for this country, and a valuable breed in any country whatever, if profit to the breeder be the first object."

"Ryelands fatten well in this country: a cross between them and the badgers fattens excessively in a short time."—*Vale of Teivy.*

A cross highly spoken of is,—1st, New Leicester and Ryeland; then that cross and improved mountaineers, or Welsh sheep of the first class.

On passing by Stanbridge, in the Vale of Glamorgan, we observed a flock of sheep of superior appearance; and on enquiring into their pedigree, were informed, that Mr. Markham of Nash, had a fine ram produced between a Cotswold ram and a Glamorgan

SHEEP.

e ewe; and that the ram of this cross, with Glamorgan ewes, produced the flock in question.

The sheep at Steanbridge are well thought of, supposed to be wilder than the unmixed Glamorgan.

Some think them so similar to the New Leicesters, as not to be easily distinguished. In the crosses that have been made into the crosses, which, Mr. Bakewell's hands, produced the New Leicesters.

various conjectures have been formed: but that which has been most considerably asserted and believed is that they were produced from a cross of the Old Leicesters and the Hereford Ryelands. This cross has

been tried, I am told, by many, but without the desired success: but now, in this county, many

have seen Mr. Markham's flocks, and those at Steanbridge, are strongly of opinion, that the New Leicesters are a cross between the Somerset Natts (exactly the same breed as those of Glamorgan) and the Swold: at least, I am assured these crosses come

grain of public spirit, are not entitled to any better reward than public contempt. But why depend so much upon him for an improved breed?—It has been very credibly said, that his great improvement consists of a cross between the Old Leicesters and the Hereford Ryelands: a man who was in the secret, and employed by Mr. B. in bringing rams and ewes, by night, and bye-ways, from Herefordshire, not obtaining the rewards he expected, blabbed out the whole mystery: at least I heard this from a very intelligent gentleman, of the greatest veracity. Why then not try twenty, or any number of experiments, rather than purchase Mr. B.'s rams and ewes, or even hire his rams at his exorbitant prices? What man of common sense can listen to such stories as *three thousand pounds* for the use of a ram to 40 ewes, for one season?—What well-informed agriculturist does not know this to be true?—What man of any sense, of prudence, and moral rectitude, will not warily and severely reprobate such extortion on the one hand, and such extreme folly and infatuation on the other?

“ I freely grant, that for a limited time, and within other reasonable bounds, a man may fairly avail himself of his useful discoveries: but to withhold them and their benefits for ever, at least so far as in him lieth, from the world at large (from that public from whom he has had an opportunity of extorting a fortune and whom he has, in some respects, considerably injured, by exciting an overstrained, and in many cases a ruinous emulation, far beyond the real worth of its object) is mean, selfish, and, I will venture to say, criminal. I therefore conclude, by asserting, that Mr. B. has been much more an enemy than a benefactor to the public.”—*Diogenes alter.*

Washing.

Washing.—The most usual practice is to drive the sheep into a fold on a river's side; a selected spot giving the whole neighbourhood in succession: water from three to four feet deep, and a purling stream on a gravelly bottom, are preferred. The number of washers is in proportion to the flock: in some places the first washer gives the sheep a rinsing, and lets it down the stream to the second, who does the same, and adds it to the third, who completes the operation, and adds the animal to the shore.

In some parts, upon the Ogmore, &c. the sheep are frequently folded near a bridge, and thrown three or four times over the battlements into a pool beneath: this renders too much upon savage diversion.

In Brecknock Upper, &c. where the flocks are so numerous that washing each sheep separately would be utterly endless, the flocks are driven repeatedly through shallow water with a rocky or gravelly bottom: thus the

other on the bench which holds the sheep; legs untied; the strokes of the shear across the barrel of the sheep, in very regular circles; are the characteristics of Silurian shearing in the three eastern counties. A shearer's work is from 30 to 40 in a day; more or less according to size, &c.

Shearing twice in the Year.—Breechings (*rhoniar*) are sheared, in most places, early in the season; for the sake of coolness, cleanliness, and health: the wool, being coarser, is also appropriated to separate purposes.

In the milder climates, Cardigan below Aeron, &c. the main carcass, or barrel, is sheared twice: at the June shearing*, the breech and tail wool is left; at the Michaelmas shearing, some wool is left about the shoulder and neck; this gives the sheep, for a while, a bisonic appearance; and in both cases, incomplete shearing renders them unsightly. The fleece of the first shearing is from 1½lb. to 2lb.; and of the second, from ½ to 1lb.

Cardiganshire wool has been long noted for its *felt*-ing quality. Hatters are numerous from the Dovey to the Teivy, in the vicinity of Llan Gwrytton, Lledrod, &c.: the reason they give for crowding so much into a tract so thinly inhabited, is the fitness of the wool for their trade, and the cheapness of peat fuel, which gives the most regular heat. The common hats worn in South Wales, are mostly made in Cardiganshire; they are strong and durable, some selling from 10s. to 12s.

The June shearing, though the wool be shorter, is

* "Shearing time, once in the year, about the 20th of June: when sheared twice, the first takes place about the latter end of May; and the second about the 10th of October."—*Mr. Turner.*

softer,

SHEEP.

er, finer, and works better; takes also the dye better than wool of a whole year's growth: the Michaelmas shearing is not so proper, at least by itself, for *ring*; but it is the best of any for *felting*.

A Cardiganshire hatter, settled in Glamorgan, assured me, that the superiority of Cardigan for *felting*, consists entirely in being wool of the Michaelmas shearing: he had proved this, by recommending to owners of the Down and Gower sheep to shear twice, to furnish him with wool of the latter *ring*.

Shearing twice a year was known before, though much practised in Glamorgan: but it was not known that wool of the second shearing was peculiarly proper for *felting*: it was generally imposed upon the market for lamb's wool, by the few who practised *ring* twice a-year. The Glamorgan sheep bear a second shearing as well as those of Cardigan; and the

in the earthe, and with a sledge they sett these hurdles fast in the ground: and these folds they will put upon some peece of ground where they meane to till; in which they shut up their *cattle* everie night, from mydd March to mydd November: this fold they remove everie three or four nights till the whole peece be thoroughly mucked: after this manner a peece of ground is prepared everie yeare; and in March they sowe otes in it: and crop it for seven, eight, or ten yeares.

"I doe not commend this kinde of *folding*, although it be a verie good way to mend the lande; for in this sorte, 200 sheepe and 20 other beastes will muck nigh two acres* of ground in a whole somer season; whereas, if they were kept in folds and yards, upon strawe or other bedding, they would well such mendments as would suffice for six acres of wheat and rye land; but in this they account savinge the carredge of this muck to the lande intended to be sowne, and the twise or thrise plowing and harrowing of the same; but the *husbandman that spareth paine, spareth thrifte*."—*Hist. Pembr. by G. O.* 1560.

This kind of folding continued, in the same fenceless tracts, with little or no alteration, until within these few years.

"On the upland farms, they have pretty numerous flocks. Late in the spring, about barley-seed time, they begin to look after them. A boy or a girl, from ten to fourteen years of age, is the only herd: from that time to the end of harvest, they are *folded* in the night, and for about two hours in the middle of the day, whilst the herd has his dinner: for the rest of

* We presume he meant the provincial acre (*area folding*) of 10260 square yards.

SHEEP.

year, the sheep are suffered to take their own range. Cattle and horses are confined in this way as well as sheep. A mere fold is soon produced; a few gate-poles fixed in the ground, covered with furze faggots on the outside, is the common one."—*Mr. Turpin, Orig. Report of Cardig. 1794.*

Since the year 1794, the advance in the price and value of neat cattle, indemnified them in most parts, from this species of confinement and starvation; as it was found injurious to their health and growth*.

The Dimetian *sheep-folding* system is also upon the same line. In the parts where it was mostly practised, flocks are not sufficiently numerous to manure well a considerable quantity of land; neither is the quantity of sheep appropriate, being naturally too unstable, and impatient of controul.

The folding system, upon its best principles, as practised in the otherwise manureless tracts in England, has not been introduced into this district, to

and burned, and then ploughed in the ashes and folded it, and then sowed it with rye, of which there is a very promising crop.

2. "The sheep are certainly not diminished in value by folding, more than an ox is by working; if they have a sufficiency of food, they will keep themselves in good order, and attain their full growth at the usual time; and from being continually under the shepherd's eyes, are not liable to so many accidents.

"Very large tracts of poorer land than any in Radnorshire, are cultivated, and maintained in good condition, in Wiltshire, Hampshire, and Dorsetshire, entirely by *folding* sheep; and thousands of acres in those counties could not be cultivated by any other means.

"The sheep you saw in my fold, were of the original South Down breed, excepting a few I pointed out to you.

"I have a great many of the cross breed on my sheep-walks on the hills, got by a South Down ram out of the native ewes: there are some three and four years old, that were born on the hills, and have lived there entirely, and bear the winter as well as the other wild ones: in size they are evidently larger, and handsomer, than those got by the native rams; but as the ewes differ so much in size, it is not very easy to ascertain the exact difference. The quality of the wool is certainly very much improved by the cross.

"I have never attempted to fold any of the produce of the wild ewes; but I should think if they were taken in as soon as they are weaned, they might become sufficiently tractable.

3. "The sheep here are subject to few diseases: the red water is very sudden, and generally fatal in 24 hours.

hours. They are much swollen, and their inside almost full of bloody water: they are generally seized on change of food, and when they are in good order. Of remedies, I have found bleeding the most effectual, if done soon enough. The deaths which happen in my flock, have been very few for these last two or three years, since I have been able to get proper food for them; I believe not exceeding one out of a hundred annually.—*Cwm Elain, June 24th.*—THOMAS GROVE.”

In descending the Vale of Teivy, in June 1813, we were directed to the notice of two contiguous farms, nearly equal in soil and aspect, intended to be managed under different modes of husbandry. Both the farms are of considerable extent: one is in the occupation of its owner, Mr. Hart Davis, Member for Bristol, and entrusted to the management of a Perthshire bailiff, who has commenced his whip-and-rein ploughing and *liming* system: the other is in the occupation of James Whittingham, Esq. who entrusts it to the care of an Essex bailiff, who, it is said, is to carry on the complete *folding* system, *without liming*.

Had both these farms been valued by a good judge, previously to the commencement of the respective farming systems; were a correct ledger kept on each farm, of the whole expenses and profits, for fourteen years successively; and then both farms to be again valued, according to their *then* condition, a tolerably exact estimate might be formed, so as to throw considerable light upon a disputed subject. In this part, so remote from lime or marl, we should expect the balance of profit to be in favour of the *folding* system.

There is much respect due to Mr. Hart Davis, for his spirited and liberal exertions for the improvement of
this

this part, and eventually of the whole country. He proposed to his tenants, on the Peterwell and Millfield estates, to be at the expense of educating a certain number of their sons in the science and practice of the most approved systems of agriculture, in the most approved districts, either in England or Scotland; and to provide farms for them, to put their acquired science in practice, when they returned home.

It will be seen in p. 302, Vol. I. of this Survey, that we recommended such a scheme for the dissemination of agricultural science in Wales. That part was sent to the press before we were informed of the very plan we recommended, having been proposed by Mr. Davis to his tenants. We have now only to add, that his proposal, liberal and patriotic as it was, has been rejected by his tenants, because it was not understood in its true light. Mr. Davis, however, was not easily foiled in his expectations of future improvements: as the Welsh would not go into Scotland, the Scots must come into Wales: he accordingly brought over a clan, consisting of a manager, ploughmen, and a ploughwright; as sober and industrious a set as ever crossed the Tweed. The Mac-Farlans, and Mac-Dougals, are now become pretty numerous in Wales; Mr. Johns, Sir Edward Hamilton, and some others, having introduced them some years before.

Night-fields.—"Mr. Hassall, of Kil-Rhiwau, in Pembrokeshire, has *night-fields* for *sheep*, instead of *folding*: the sheep are turned in at the close of day, and let out in the morning. I saw one of these fields, of three or four acres; and such grass I never saw any where. Mr. H. says, that in spring, the grass will be earlier than can possibly be believed by any one that never saw it. He says that *cattle* also may be *night-*

SHEEP.

ed. Night-fields should never be more than four
es on a large farm, and one, two, or three acres on
er farms: but there should be three night-fields on
y farm. The utility of them is very great for
y lambs, and for many other purposes. If the
nt-fields are too large, the manure derived from the
ep and cattle will not be in sufficient quantity, or
y proportionate to the field, and to produce the
red effect, unless the stock is very large indeed.

Sheep are always injured by close folding, and
ome diseased: the sheep of folding countries are
ays more unhealthy than those of districts where
ing is not practised; they are also otherwise dete-
ated; but in night-fields they are more at liberty;
eed but little if any thing deprived of liberty: and
ight-fields are so formed, with respect to situation
disposition, as to be in a sheltered and dry part of
farm, it will be a great accommodation to the flock;

as strongly asserted by others, who ought to be the most competent judges."—*D.*

SECT. III.—HORSES,

UNDER the Welsh Laws, horses were allowed to harrow, but not to plough, which was exclusively the province of oxen. The qualifications of a sumpter-horse were, that "he would carry his load, and draw a harrow or car up and down hill, without flinching." A horse was also to be warranted free from three diseases; "from giddiness for three dews, from the strangles for three moons, and from the glanders for a whole year." If within these periods respectively, the animal became affected, the seller was to take him back, or return one-third of the value. The value of every article, in Rural and Domestic Economy, was fixed by law: that of a stallion was 1*l.*; a pack, or other working horse, 10*s.*; and a palfrey, 13*s.* 4*d.*

These *palfreys* composed formerly the cavalry of Wales: for it should be known, that the Welsh had cavalry, as well as infantry, during their hard-fought struggles for independence. General Elliot was not the first officer who saw the advantages arising from employing squadrons of light-horse. The palfreys were light, and exceedingly active; and many a time did they lead the heavy dragoons of the invaders of their pastures into bogs and swamps, never to be seen any more*.

* A regiment of foreign heavy cavalry, in the service of one of the Kings of England, when he invaded North Wales, is said to have been engulfed in a bog, in Denbighshire, since called *Cors y Saeon*; and horse-shoes of uncommon size, are still occasionally dug up there, in cutting peat fuel.

This breed has been too much neglected; and is now, in many parts, nearly extinct: some suppose it to have been produced between a strong working horse (*swmer-farch*) and the small Welsh merlins, a spirited pigmy race still occupying some hilly walks in the interior of the Principality. It has been a question with persons of judgment, even with the knowing-ones of the turf, which could shew most *blood* (strength and activity, in proportion to bone and muscle), the English race-horse, or the welsh merlin? Childers's feats are recorded at Newmarket; and the merlins are not without their calendar.

"We had formerly a very good breed of hardy strong punches, fit for riding and working upon the farm, being a cross between a good-sized horse and the small merlins; and very useful they were; but the breed has almost been totally neglected and lost: for they cross now too much with the large and sluggish cart-horses. This cross may turn out very good team-horses, especially upon roads; but they are not near so hardy, safe, and useful for all purposes as the half-merlins. These were from $13\frac{1}{2}$ to $14\frac{1}{2}$ hands high, very strong, spirited, and sure-footed upon the most difficult roads."—*Mr. Herbert.*

Pembrokeshire.—"The horses of this county are of various breeds; the Pembroke kind, is a truss short-jointed nag, of about 14 or $14\frac{1}{2}$ hands high; and makes a very serviceable roadster, if not over-weighted. The best-fashioned of these, are generally broke for the saddle, and are in good demand at our fairs, among the dealers who come from the interior parts of England to buy them. Mares of this class, are frequently put to blood-horses, which our principal gentlemen of fortune

tune introduce, much to their praise: and from this cross an excellent serviceable kind of horse is produced, either for the chase, the road, or for harness; according as he turns out for fashion, speed, and strength."—*Mr. Hassall.*

This account, by Mr. Hassall, would have suited at the time, with more or less variation, each of the other counties of the district; as to the quality of the original breed, and the success of crossing it with blood-horses. He mentions also the introduction of the Suffolk punches at Stackpole Court, and other cart-stallions from Herefordshire: the draught kind are every where undergoing a similar improvement. Blood-stallions are kept by the principal proprietors, or by their encouragement, in several parts of the district; which are allowed to cover half-bred mares at half prices, in order to induce the tenantry to improve their stock. Agricultural Societies, and especially that of Cardiganshire, have been very active in encouraging the improvement of breed, in every species of live stock. The Cardigan Society, for several years, gave two premiums, of 40 guineas each, to the owners of the two best stallions (hunters) which should attend certain markets, and require no more than one guinea for covering each mare for the season. In this class, this Society at present confines itself to premiums for the best horses of the *cart* kind, bred in the county, and to be shown at three years old. The unremitting exertions of this Society, it is presumed, will soon be able to wipe off the odium cast upon the treatment of horses by common farmers in this county, in the former Report, p. 33.

"The necessary attendance on horses is too much neglected: they are generally, after a hard day's work,

little thought of. *In the winter*, a scanty fare of hay, or a due proportion of barley-straw, or pea-haulm, till about eight o'clock at night, *then turned out to grass*, with the addition of fodder in the morning, is, with the common farmer, the usual allowance.

"In the spring of the year they have a small quantity of oats. That they do pretty well on such treatment, is the best panegyric of a Welsh horse. More roomy and convenient stables, might be some *inducement* to take better care of them."

Improvement in the breed, which takes place rapidly, and the present great advance in the price of good horses of every description, are of themselves sufficient *inducements*, for a less shrewd people than the Cardiganians are in general, to pay greater attention to the rearing and management of horses.

Nothing pays better of late to the farmers, than proper care to the rearing of good horses: and let them never forget the old farmer's adage, which we have used before,—that "much of a horse's breed goes in at his mouth."

Some principal proprietors in the counties of Pembroke and Cardigan, have, for some years, instituted annual races, and give silver cups to the winners, bred in the respective districts. These recreations, usually attended with the national exercises, have a good effect in training young farmers, &c. to a proper attention in breeding and rearing good horses; and indeed the cavalcade of a Cardiganshire wedding makes already a very respectable appearance.

Though young horses, of the saddle, mixed, or cart kind, sell of late at high prices, yet the cart kind, of all others, remains most permanently dear. For a compact young carter, having much strength within
little

little compass, a farmer may demand almost any price : and petty farmers paying no more rent perhaps than 40*l.* a year, frequently sell weanling colts, of the cart kind, the first autumn, for from 15*l.* to 20*l.* : a few years back, from 6*l.* to 10*l.* was a fair price.

The heavy, sluggish kind of horses, are not numerous in the district ; and may they never be so. Their proper province is a London waggon, or a heavy timber carriage, where weight requires weight ; but upon a farm, especially in most parts of Wales, they are ruinous : they consume more, and do less work, than the more active and hardy natives, improved by selection and judicious crossing. These kind of half bred horses, are commonly easier kept in condition, and always quicker in their movements : three of them, drawing at length, will plough an acre, of common soil, in as short a time as four of the heavy horses frequently do ; and much cheaper, when keep, gearing, tax, and all are considered : but servants used to these slow horses, are too apt to bring our quick pacers to their own gait and time, for the sake of ease.

An infamous practice obtained some years ago among the heavy cart-horses, in cutting and trimming their tails so close, that not a hair was left to whip off the flies in July. Laziness said, that cumbersome cruppers were easier put on ; and ignorance thought that the cutting of the tail into a stump, strengthened the back of the horse ; than which nothing can be more preposterous. To the credit of Wales, this Saxon cut did not extend much westward of the borders ; and may it speedily disappear in every part.

As for diseases of horses, we must refer to books on the subject. We do not know of any of the pupils of the Veterinary College having come to reside within

2 RABBITS—POULTRY—PIGEONS—BEES.

subjects; and being willing to dismiss, in as few words as possible, the remaining four articles of this chapter on Live Stock, which are of very inferior consideration, when compared with the preceding four; requested our surly Correspondent, *Diogenes alter*, furnish us with his information thereon; and he immediately favoured us with the following laconic answers, which we beg leave to insert, without note or comment.

Q. 5. *Rabbits?*—Ans. “Very good *Welsh* rabbits at some of the alehouses: other kinds of rabbits must be *ferreted* out.

Q. 6. *Poultry?*—“Some about the barn doors; some destroyed by foxes; others on *Cors Goch* ar *Deivi*.”

Q. 7. *Pigeons?*—“On the wing: and doing mis-

CHAP. XIV.

RURAL ECONOMY.

SECT. I.—LABOUR, SERVANTS, LABOURERS, &c.

IN the pastoral ages, the price of labour was but little known: Agriculture, in proportion to its progress, increased the demand for labour, and consequently raised its value.

In countries, without extensive mine works, and numerous established manufactories; where agriculture, consisting of tillage and rearing of stock, occupies and supports nearly the whole population; the price of labour, having attained a certain point, continues more stationary than in other places under different circumstances: and what renders it still less fluctuating, is a kind of feudal connection, such as that which still subsists between farmers and their labourers, in numerous instances, in the Dimetian counties of Cardigan, Pembroke, and Caermarthen; where labourers and their families may be considered as heir-looms or appendages to the farms, to work all the year round, and one year after another, at a fixed low rate per day, without victuals. The advantages to the labourers, counterbalancing this low rate of wages, are a house, garden, and keep of a cow, at a low rent; the setting of a quantity of potatoes in a fallow, and bread corn at a fixed rate per bushel all the year round, which

which in general is considerably lower than the market price: but these perquisites are far from being general. A few years back, men worked, in some places, all the year round, for 6*d.* a day, finding their own victuals. “*Until last year,*” says Mr. Lloyd, Cardigan; “as it was thought too little (and well it might) seven-pence was given in winter, eight-pence in summer. If the farmer finds the labourer in provisions, he pays him two-pence or three-pence a day, towards the subsistence of his wife and family.”—1794.

About the same time, strong women worked in the fields during hay harvest, &c. for three-pence a day, finding their own breakfast and dinner, if they had any; and in going home in the evening, they had their perquisite of *hoglyn*, or *swper adre*, consisting of bread, butter, and cheese, commensurate with the subsistence of the house-keeper.

Some had their cottages rent free, 6*d.* a day all the year, excepting harvest, when they had 1*s.* a day;

In June 1813, we saw four men thrashing on two plank or moveable floors, already described in Chap. III.—oats, at 1*d.* and wheat at 2*d.* per bushel, on their own victuals: “but,” they observed, “we have each of us a house, garden, keep of a cow, and setting of potatoes in our master’s fallow, for two guineas a year.” Without these perquisites, in the same tract, 15*d.* for oats, and 2*s.* 6*d.* for wheat, per quarter, were usually paid for thrashing.

The rate of labour in Pembroke *below*, is higher, by an average of about 2*d.* per day, than in Pembroke *above* the mountains: so it is in the Vale of Towy, and the south-west of Caermarthenshire: but in Cardiganshire, the lowest wages is in the lower division, or that termed “below Aeron.” In many parts of the upper division, one shilling per day is given throughout the year; or sixpence with victuals: harvest work is advanced in some places to 18*d.* and 2*s.* for men, and 1*s.* for women, with victuals.

In the eastern counties, an earlier attention to improvements in agriculture, and, more than that, the opening of very extensive collieries and iron-works, caused a rapid advance in the price of labour; which varies, according to circumstances, from 8*s.* to 10*s.* a week in winter, and from 9*s.* to 12*s.* in summer; on emergencies, 15*s.* a week; and during harvest, occasionally, from 2*s.* 6*d.* to 3*s.* and 4*s.* per day, with victuals. West of Ogmore, we found 10*s.* a week given all the year round, and wheat for the labourer’s use, at 8*s.* a bushel; which, compared with the market price, advanced the wages to about 13*s.* a week.

Much wheat, &c. was formerly cut by what is called

called "*love reaping* (medel gymmorth)." The farmer published his day; and all his dependents and trading customers in the vicinity, either came, or sent substitutes: poor labourers also gave a day for every horse in the team, which they borrowed either for carrying or ploughing; and many, who were under no bond of obligation, would be glad of having their labour accepted for a participation in the fare and arriment usually attendant upon such occasions.

These "*love reaps*" are still in use, though not so general as formerly; for task-work is now found more convenient, and perhaps more profitable on both sides. About half a century back, wheat was hand-reaped for 6*d.* an acre, and one meal (dinner) each day: it afterwards advanced to 5*s.* and 6*s.* an acre, with full meals; and now, the common rate in many places is from 8*s.* to 10*s.* with an allowance of beer only; including the grain into sheaves, and stacking into fours or sixes, included. In many cases, the charge paid

The rate of task-work, in general, cannot be well defined, owing to the variation of circumstances, which can be known only on the spot.

The average rate of draining, is 1*d.* per yard; or 6*d.* for cutting, and 2*d.* for filling, the most customary rood of eight yards.

Making new fences, with grown quicks, or staggarads, from woods or brakes, from 20*d.* to 2*s.* 6*d.* per rood; according to the work to be done: or 6*d.* a rood for raising the staggarads; 6*d.* for setting; 1*s.* for mounding, commonly called ditching, three sods high on the front, and two sods on the rear side; and 3*d.* for bearding; in all 2*s.* 3*d.* Where the fence is to be guarded by posts and rails, the charge will be advanced accordingly; and the inner mound of sods may be dispensed with, excepting on wet lands; though a double mounded fence, three sods on one side and two on the other, looks better on all kinds of soils, and keeps the mould or soil better to the roots of the quicksets; and the inner foss will besoon filled again by the plough, if required, so as not to occasion any loss in the quantity of the enclosure.

Fences of stones and sods in alternate layers, three to three and a half feet wide at bottom, three and a half to four feet high, 20 inches wide at top; from 18*d.* to 20*d.* per perch of eight yards. For furze seed or plants, the mounds are five feet wide at bottom, and three feet at top; and are charged accordingly.—

Pembroke.

Alternate stone and sod fence, eight feet wide at bottom, four feet at top, and five feet high, 27*d.* per perch of eight yards.—*Cardig.*

Others, near Cardigan, planted with quicks, six feet at bottom, three at top, and five and a half high, from

from 2s. to 3s. per perch. Six feet high, six wide at the base, two at the top, planted with quicks, and briars and brambles in the facings; 18d. to 2s. per perch.

"The common price paid to colliers for cutting the binding coal, is from 2s. 4d. to 2s. 6d. per ton, long weight; by which they will earn, "according to task and luck," from 3s. to 7s. per day each; or from 4l. to 9l. a month."—*Blaen Avon*.

Radnorshire, though more remote than Glamorgan and Brecknock from the effect of the iron-works and collieries; yet the price of labour therein is not found to be much lower on that account; as appears by the following communication.

"Labour, on a farm, is divided between the master, servants, and labourers. On a farm of 60l. per annum, the farmer does most of the work himself, with the assistance of a strong boy; from thence to 100l. a-year, he generally keeps a man servant besides; from thence to 150l., two more servants (a waggoner and shepherd) are kept, besides the boy; and so on, at an average, an additional servant, or constant labourer, is kept, for every additional 50l. rent; besides occasional ones when wanted. The wages of a man servant, is from 10l. to 15l. a-year; of a boy from 4l. to 7l. In farm houses, where the mistress is active, farms of 100l. a-year, have one maid servant; and those above that, have two. The wages of maid servants are according to their ages and capacity for work, from 3l. to 8l. a-year. Labourers' hire is from 8s. to 10s. a week in winter, and from 9s. to 12s. in summer. Time of working is from six to six in summer; excepting harvest time, when they work till night, if wanted: time of working in winter is from
light

light to dark. Labourers, in most places, have their diet at the farm houses. The time consumed at meals is not particularly attended to, but they begin to work as soon as the meal is ended: servants are not particular, in general, respecting their working hours."—*T. F. L.*

Servants' wages have undergone a more universal advance than the price of labour by the day, or by job-work. Old farmers, still living, remember their hiring servants, the most capable of all operations in husbandry, as *then* practised, for from 5*l.* to 6*l.* a-year: and when a few came to demand 7*l.*, the world was thought to be near its end. Now the average of the whole district, from 18 years old and upwards, may be twice that sum, or 14*l.*, though most waggoners, undertakers of some care, &c. hire for from 15 to 17 guineas; and some, it is said, have 20*l.* a-year, exclusive of meat, drink, lodging, and washing: some farmers do not allow the latter perquisite when wages run high.

Quality of Servants.—"Servants get worse and worse, as their wages advance," and "no good ones to be had," are complaints almost universal: but if we examine a little into this, we shall find it to be one of those "vulgar errors," which have always descended from generation to generation, and always considered as new, and peculiar only to the existing age.

Dean Swift's "*Advice to Servants*," which undoubtedly, though a burlesque, was a pretty correct description, with some exaggeration, of the conduct of many servants in the beginning of last century, is still considered as peculiarly applicable to many of the same class in the present day.

Jethro Tull, about the same time, complains of

servants and labourers being, at that period, among the most formidable obstacles to improvement in agriculture: he seems to write very feelingly, and from much experience on the subject.

“ ’Tis the most formidable objection against our agriculture, that the *defection* of servants and labourers is such, that few gentlemen can keep their lands upon their own hands; but rather than make *nothing* of them, they *let* them for a *little* to tenants, who can bear to be insulted, assaulted, kicked, cuffed, and bridewelled, with more patience than gentlemen are endowed with. ****: Not that there is any want of hands, to receive our money, to take away our goods, and to beat us; but such are wanting as will work faithfully at reasonable wages. By the general complaint of their behaviour, they more resemble French dragoons in times of persecution than servants.”—*Horse-hoeing Husbandry*, printed in 1733.

By this woeful complaint of the father of the drilling husbandry, it appears that the present opinions of “servants getting worse and worse,” are not well founded: most probably, *semper eadem* might have suited them as a motto, at all periods, from the commencement of agriculture to the present day: and as to the present rate of wages, supposed to be enormously high, it will be greatly reduced, if we bring the declension in the value of money into consideration. But faithful and industrious servants have not been wanting from Abraham’s trusty Eleazar to the present time; though with regret it must be allowed, that servants of a contrary character are by far the most numerous. Agricultural Societies encourage long and faithful services in the same situations, with rewards due to their merit.

Commence-

Commencement of the Year of Servants.—In this respect also, the Dimetians and Silurians vary in their customs. In the western counties, servants more generally begin their year in autumn; in some parts in October, in others in November: in the eastern counties, the first of May begins the year: though, in both divisions, they have established fairs in different places, at both calends, for hiring; for the convenience of filling up vacancies occasioned by the inferior tribes of *turned-offs* and *runaways*. Corners of counties may form exceptions to this general rule; as in Glamorgan West of Neath, the more general commencement of the year of servants may be the same as that in Caermarthenshire, as it formerly belonged to the Dimetian kingdom, and may still retain many of its rural customs.

SECT. II.—PROVISIONS.

1. *Bread (bara)* has been commonly considered, among the Welsh, as the “*staff of life*,” and more especially so before the general cultivation of potatoes. It is still the main article of provision; and is manufactured in various modes, from different species of grain. The Silures and Dimetæ distinguish themselves from each other, in this particular. From a peculiarity of soil to produce a particular grain, in superior quantity and quality, the habits of men are formed so as to *prefer* the bread of that particular grain to any other.

The favourite and customary bread of the Dimetian peasants, &c., is that made from berley meal, unleavened, and baked in thin cakes on cast-iron plates.—“*Bara haid, a llech yn amla.*”—*D. T.* in 1720.

“On some of the hills dividing the Vales of the Towy and the Teivy, oats and barley are sown together; thrashed, kiln-dried, and ground into meal; from which a kind of bread called *sipris* is made.”—*E. W.*

In the highlands of the six counties, many use oat-meal bread: rye bread also is not uncommon in parts of Cardiganshire; in 1720, rye bread was the most common in Radnorshire.—“*Bara rhyg yw'r ymborth anla.*”—*D. T.*

In the vales of the eastern counties, wheat has, time out of mind, been the principal bread corn. In Glamorgan, the white Lammas kind is ground down, without extracting any bran, for common bread. In Brecon and Radnor, red Lammas, chiefly, is ground and dressed in the usual way, for the fare of farmers and their families on all well cultivated farms; but in more elevated and less cultivated parts, a mixture of wheat and rye, called muncorn, or a mixture of wheat and barley, and in some instances barley alone. In seasons of scarcity, when various expedients are put to the test, rye mixed with good barley has been found preferable to wheat and barley in equal proportions; especially during the summer's drought: the absorbent quality of barley meal, and the moist quality of rye meal, well according with each other.

2. *Potatoes* are always an article of diet, not only much approved, but also most generally of any; and in seasons of scarcity of bread corn, they are its best and cheapest substitute, in various modes of preparation. The extent of their cultivation in this district has been already noticed, in the Section on *Green Crops*.

During the dearth of 1809, a valuable tract, by
W. C.

W. C. of Chester, appeared in some weekly newspapers, addressed to farmers and others in Wales, Scotland, &c. and recommending the substitution of *potatoc farina* for *oatmeal*. Not knowing that it is printed in any permanent publication, and finding it replete with much useful information on agriculture in general; and as we do not know how soon similar seasons of dearth may visit us, we intend inserting the tract at length, in No. III. of the Appendix subjoined to this Report.

Such has been the auxiliary supply of provisions procured from a general cultivation of *potatoes*, that it may be rationally presumed, that had it not been for the introduction of this valuable plant, the population of these British Islands would not now have amounted to its present rate.

Other *vegetables*, cultivated for diet, within the district, are treated of in the Chapter, on *Gardens*; with the assistance of these, and especially the alliacious kinds, varieties of soups of the meagre kind, gruels, &c. (*cawl cennin*, *ac ervin*) are made, in several parts of the district; in a humble way indeed; but they are wholesome, and suit the palates of the peasantry. The human constitution is such, that it is capable of adapting itself to any particular species of diet, provided it be wholesome, timely entered upon, and regularly persevered in. Those who live, in a considerable degree, upon a low fare, of the soup or gruel kind, are moreover naturally less addicted to the drinking of malt liquors; but nevertheless, they attain as perfect a maturity of bodily and mental faculties, and as early, as others who plume themselves with enjoying the superior fare of animal food twice a day, with the additional felicity of fermented liquors. One

county in Wales is noted for the simplicity of the common fare of its peasantry; and yet these very men have for ages been noted for their superior prowess in wrestling, and other feats requiring muscular strength.

We do not deny the temporary effect of malt liquors, &c., in supporting the animal spirits under hard labour; but they are no more permanent to that effect than opium: the presumed necessity of such a fare had its origin in, and is still supported by, a depraved appetite: genuine animal spirits have an origin superior to the mashing tub, or the butcher's stall.

3. *Animal Food.*—The chief markets are regularly supplied with veal, mutton, and beef, in their respective seasons; for the tables of the superior classes, and the more opulent farmers, who exhibit two bills of fare in their houses: but the lower class of farmers, and the peasantry, (excepting in towns and manufacturing places) are seldom treated with “fresh meat.” Bacon, salted and dried beef (*coch yr wden*) and occasionally mutton in the same state, furnish their Sunday repasts, and now and then a meal in the week days; and if, in some parts, they prefer the meal consisting in part of animal food for breakfast, and spoon meat for dinner, it may be equally judicious as the contrary customs. In many parts of the western counties, the labouring poor seldom aspire to the luxury of killing a pig, which is more generally the case with their fellow class in the eastern counties.

Formerly, many of the superior orders were in the habit of fulfilling a kind of religious duty, in killing a beeve about Christmas Eve, and sharing the whole among the poor of their parish, in pieces proportionate to their respective families. It is to be regretted that
the

the increasing parochial rates, and its attendant increasing importunity of paupers, put a stop to these laudable acts of charity, excepting in a few solitary cases, or at seasons of uncommon dearth.

4. *Fish*.—If we reflect on a line of sea coast, of upwards of 200 miles; and the great number of fine rivers and purling brooks which intersect the district in all directions; the first idea naturally occurring to us would be, that a plentiful supply of *fish* might greatly increase the stock of provisions, even that of the labouring class: it seems however as yet to be far from being the case.

The species of fish, on which the labouring poor formerly depended most for a store of provisions, to be eaten with potatoes, with bread and *mwdran*, &c. was the *herring*.

“Barley bread and potatoes, are the chief sustenance of the poor; and sometimes a few *herrings* in the autumn, when they are moderately cheap.”—*Mr. Turnor*.

“A few years back, the winter provisions of the poor were salt *herrings*; but the salt duties taking place, the poor were disabled from getting them. The herring fishery is still continued, so far as to supply, in some degree, the markets of the interior; but here they are no longer the food of the poor.”—*E. W.*

“I have heard of a maize of herrings (*mwys o sea-dan bwrw*), or thirty score, and one thrown in upon every score, in all 630, being sold formerly, in Cardigan Bay, for four groats; and I have myself frequently bought a maize for from 4s. to 5s.: they were 40 for a penny, at 16d. a maize, and 10 for a penny, at 5s. There were then (about 45 years back) about 80 open

PROVISIONS.

ing boats belonging to Aberystwyth: I could *then* e bought a cod for 2*d.* with about half a dozen rings in its belly; I have seen a cart-load of codfish at Clarach, for 5*s.* *Now*, there are only a few ked vessels at Aberystwyth; and at times we pay re for herrings 3*d.* a piece, owing to so few being en; and we are frequently under the necessity of porting salted herrings from the Isle of Man, &c.”—

E.

Herrings come, in general, to the coasts of Caran Bay, from the middle to the end of September: is considered the best time, as they will better r carriage to distant markets, and the harvest being monly over, the fishermen can be easier spared.”—

W.

Where fishermen nest together, they seldom assist ch in expediting our harvest work; for they om aim at a higher independence than living

Pembrokeshire.—"Our fisheries on the coast are of great value; but for want of a regular sale, the fishermen are not attentive to any sort but herrings, salmon, and shell-fish; so that our supply of every other sort is very uncertain during the rest of the year."
—*Mr. Hassall.*

"The fishing boats or skiffs at *St. Dogmaels*, on the Teivy, are from 8 to 10, 12, 15, and some 20 tons, with masts and sails; but mostly open, without decks; with from six to eight men attached to each. These fishermen, by suspending to one net, by means of strong lines, another net, at the distance of about three feet, and to this second net a third, and sometimes a fourth; are able, they say, to rake the sea to as great a depth as the herrings generally go.

"The fish usually taken, besides herrings, are cod, haddock, whittings, skate, rays, turbot, bret, plaise, flounders, soals, mullets, gurnards, mackrel, dories, shad, sewin, salmon, and some other kinds."—*E. W.*

Fishguard Bay.—"A general fishery carried on here to the extent it is capable of, could not fail to be productive of the greatest advantages, as this bay has been pronounced by experienced fishermen from Liverpool, who at times in summer have stretched so far, and have returned laden with turbot, John Dory, and other fish of the choicest kinds, to be equal, if not superior, for its fishing banks, to any place from Scotland to the Land's End; yet the inhabitants of Fishguard, notwithstanding every argument that has been enforced, and encouragement offered to fix their attention to this object, deaf as the rocks that guard their shores, untractable as the waves that dash against them—can never be brought to accede to a plan which will call
for

for the use of trowls, trammels, or the like nets which sweep and drag the bottom—and give up prejudices in which they are countenanced and protected by some obsolete though unrepealed statutes, forbidding the use of nets of the above description, within certain distances of places where herrings are usually taken, and framed on a supposition that such practices were destructive to the beds of the young fry of that fish; a supposition founded on a perfect ignorance of natural history. In short, inadequate as the means may be to the end proposed, every thing is made to bend to this absurd idea of cherishing the herring fishery, which for some years has been much on the decline; nothing like the quantities being now taken to what formerly were; and seldom any cured for exportation: their greatest capture of late being insufficient to answer the demand of the country for that article, which, in conjunction with potatoes, constitute the principal food of the lower orders of the people.

“There are 17 boats employed in this fishery, which begins about the latter end of harvest, and continues till Christmas; the appearance of a single herring operating so as to absorb every other attention, and induce them not to desist.”—*Mr. Fenton.*

Salmon, is another article of importance, in the list of provisions; and was sold formerly, in several parts of the district, at very low rates. At the mouths of the Glamorgan rivers, about 40 years back, salmon was to be had occasionally at the rate of 24lb. for 1s.; and so late as the year 1794, for 2d. per lb. at Fishguard. Now, in Glamorgan, 8d. per lb. is considered cheap, and from 10d. to 1s. as an average price.

We are indebted to an all-bountiful Providence for blessings and favours innumerable; and among others,
for

for the varieties of seasons in which salmon spawn in different rivers; so that they might be had, from some part or other, in the highest state of perfection, were conveyances more practicable, at almost every season within the calendar. In the spring, the salmon of the eastern rivers are in season, and continue so, until the frequenters of more western rivers are in perfection to succeed them, &c.

The river Ogmores is highly spoken of, for the excellency of its salmon and sewin; the salmon of the Usk, Ely, and Teivy, are said to be larger, but not so fine: so say the Silurians; but the Dimetians will scarcely allow any salmon to be so delicious as those of their favourite Teivy; which must be allowed to be richly flavoured, and perhaps more regularly marbled than any other within the district*.

The tide flows up the Teivy for about seven miles, from Cardigan-bar up to Llechryd, where the "King's-weir" is situate; and which would be capable of affording a good supply of salmon for the interior of Wales and England, were more commodious

* G. O. the Historian of Pembrokeshire, in the 16th century, gave the decided preference to the Teivy salmon. "The principall place," says he, "for the taking of salmon is in the river Teivy, and there chiefly at Kilgeran, where the greatest weare of all Wales is to be scene, chargeably built of strong tymber frames, interlaid with stones, crossing the whole river, having six slaughter places, wherein the fish entering remaine enclosed; where there have been oftentimes taken 100 or 140, more or less, in some dayes; *the fish being most excellent, and for fatness and sweetness, exceeding those of other ryvers.* One especiall thing is to be noted of the samons of Teivy, that at all tymes in the yeere there are found some in season, yea even in winter; when in most places they are found *kipper*, leane, and unwholesome, there they are found fresh, fatt, and ruddie, between All Saints, and Christmas: though the greater number be in season in the spring and all the somer."

thorough-

thoroughfares opened. The wear at Llechryd is now in the tenure of Mr. John Bowen, who formerly had the management of the tin-plate manufactory at that place, for the Hammetts. When peace returns, which, it may be hoped, is even now* dawning, we should be glad to find Mr. Bowen relinquishing the occupation of the wear to some fisherman, incapable of higher situations; and again exercising his extensive mechanical science in some public concern, for the benefit of his native country, and his own emolument as well as amusement.

The right of fishery, as far as the tide flows, is said to be in the Crown. A lease of the Teivy was granted upon this ground; but to no purpose; the peasant fishermen claiming it, notwithstanding, by a kind of prescriptive right, anterior possibly to any established government. Below the wear at Llechryd, the coracle mode of fishing is to be seen to the greatest advantage. One hundred coracles in busy employ, it is said, may be seen at times, within the space of two miles; we had the opportunity once of numbering sixty from the ruins of Kilgeran-castle to the tin-works, being about one mile. The fisherman, seated in the centre of balance, is the mast of the vessel; with his paddle for a rudder in one hand, and the net-line in the other.

Towy is not so complete a rebel, in this respect, as the neighbour of its infancy, the *Teivy*; its fishermen allowing a limited prerogative, and paying some acknowledgment; but they are equally obnoxious to the admission of foreigners into their little republic. An English gentleman unacquainted with the provincial code, went one evening, with his nets and tackle,

* November 30, 1813.

to try his fortune on board; but the fishermen soon collecting a hostile fleet, surrounded him, and held a court of admiralty, to try him for piracy; and he was glad of such easy terms of capitulation as to steer off with his tackle only, and to return no more.

Gwain river discharges itself into Fishguard-bay. The salmon fishery at Fishguard might be turned to much greater account than it is, were it to begin as early as at Newport on the Nevern, or at St. Dogmaels on the Teivy, and other places on the coast, who, by that means, get the start of the market and the season when the price is high; whereas here, it is never attempted till about the first week in July, when the fish almost leap into the houses which skirt the tide; a signal most impatiently waited for by the fishermen, and without which they think it useless and almost presumption to try; and conclude that till it be given, the fish are either not come, or not in season; not considering that they leap at flies, which seldom make their appearance before that time. This fishery once begun, is carried on every day, till its expiration on the commencement of that of herrings, with very unequal success; some hauls being attended with none, and others with a capture of 60 or 100, particularly about the latter end of August, when the salmon, taking advantage of the frequent freshes in the river, and impelled by the strong instinct of nature, crowd to penetrate it for the purpose of depositing their spawn."—*Mr. Fenton.*

"There is alsoe great store of this fish taken in the Neverne at Newport, where they take them in a draught nett, sometymes by the scores at a draught; as also in samon wearas, of which, there be two or three up that river: also in both the Cleddes, the one
from

from Mylford-haven up to Haverfordwest, the other to Slebech and Canaston: besides other pretty rills abounding with trout; and narrow and shallow as they be, are penetrated by samon and seuinge in spawninge tyme."—*G. O.*

Having treated of the two species of fish which supply provisions in the greatest bulk, within this district: 1st, the *herring*, "which for the greate use it supplieth, and for the abundance thereof taken, above all other sorts, is called the *king of fishe*;"—and 2dly, *salmon*, to which many would have given the first place, "partely for the plentie and store thereof, but chiefly for the excellencie and daintienes thereof;"—we descend to a few species of inferior weight, or value in the statistical scale.

Salmon-trout, and sewin.—*G. O.* about 1560 says, "some thinke that sueinge, and samon peale or samon trout, are samon indeed, but want in growthe; but the best fishermen are of opinion, that they are of severall kindes, and will never become samons."

Natural History was scarcely in its cradle, when *G. O.* wrote his *History of Pembrokeshire*: in about a century afterwards, Willoughby and Ray, by ascertaining the distinctive characters, and permanent variety, of the *salmon* and *salmon-trout*, settled the dispute for ever. The fish called *sewin*, is known only in South Wales by that name; some say it is the *salmon-trout* of other countries, others deny it: however, for the present, we beg leave to recall our statement from information, in pp. 99, Vol. I. that *sewin* is not found in any river east of the Wye, or north of the Teivy; until it be proved to be a species of fish unknown elsewhere.

"The

"The *sewins* come up the Towy as far as the waterfall of Ystrad-fân, about 43 miles from the sea: they annually come up about the beginning of June, and continue in season till the latter end of August: they weigh from 1½ lb. to 4 or 5 lb. each."—*Llandovery*.

"In the Tawy and Neath rivers are salmon and trout; and a round fish called *suin*, very delicious, and seldom found in the English rivers."—*Ph. Williams to Lkuyd*, 1698.

The *samlet* seems to be a foundling, whose parents are not clearly ascertained. Lexicographers confound it with the salmon fry. Mr. Pennant, in his *British Zoology*, No. 148, gives it the classic cognomen *salmulus*; and says, that it is the least of the *trout kind*—that it inhabits many rivers in England and Wales all the year round—that it differs in character and habit from both salmon and trout—that in length it never exceeds 8½ inches—and that it has been vulgarly imagined, that there were none other than *males* of this species.

The Historian of Brecknockshire identifies Mr. Pennant's *samlet* of the Wye, &c. with the *salmon pink* of the river Usk; and agrees with that able Naturalist in some points, and differs from him entirely in others; saying—that the pinks of the Usk appear first in the spring, about the size of minnows—that they attain their full size of six or seven inches about autumn—that they soon after disappear, never, he thinks, to return; and strenuously asserts the validity of the "vulgar opinion," that among this species, "there are no females"—that the *milt* is frequently found by opening them, but the *roe* never: and concludes—that unless the diminutive fry (*samlets*) be the *imperfect produce of the salmon*, they have no known parents.

The

The writer of this article, though he never saw a *sewin* in South Wales, yet he has seen thousands of *samlets* in North Wales. They are there called, in Welsh, *brith-rhoiaid**: *brith*, from spots, resembling those of trout, but fewer in number, and six or seven transverse bars, of a blueish shade, on the sides; and *gro*, from their frequenting gravelly shallows, where they are taken, in season, by scores, in common with trout. They are *never* found in any river, nor in any part of a river, where *both* salmon and trout do not frequent. "Put in a pond by themselves, for experiment; after two or three years, the water being let out, they were found to have grown in size, but not to have increased *any* in number." A stream having trout and samlets, and frequented in spawning time by salmon, having its communication with a greater river, from whence the salmon ascended, cut off by means of a canal; the trout species still continues above the canal, but the samlets gradually disappeared.

That there are no females among samlets, may be a "vulgar opinion," but it is a general one, by all who have made observations: no one has asserted the contrary. Pennant, though he passes this off in a note, by calling it a 'vulgar imagination, yet he does not deny it; he calculated only from the common course of nature. Is it not therefore probable, since samlets appear to be incapable of propagating their own species, that they are the hybrid offspring of the female salmon and the male trout, in such rivers where their respective seasons of spawning coincide?

* In Caernarvonshire they are called *crethyll y bodiau*, i. e. thumb-marked, or thumb-sized *minnows*: they also go by the names of *siled y gro* and *siled brithion*.

As articles of provision, samlets are fried, potted, and pickled.

Burry River, Caermarthen Bay, &c.—"The coal, iron, and copper works, established along the coal tract, have induced the natives, by constant employ and good wages, to relinquish their former occupation of fishing. A Dartmouth Company now supplies a considerable portion of the Bristol market, with white fish, caught on this coast, by trolling. The main bed of fish is from Worme's Head, in Gower, towards Tenby, and extending southward several leagues around Lundy Island."

Species.—"Salmon and sewin (in the Burry or Loughor river) equal to those of the Towy and Teivy.—Cod, from 10lb. to 30lb. not in great quantity—Basse, from 3lb. to 20lb.—Mullet, from 1lb. to 10lb.—Whitings, 1lb.

"Flat-fish.—Turbot, from 10lb. to 30lb., or 35lb.; some of 40 lb. have been caught."

We saw 3cwt. brought into Tenby at once, after a short cruize.

"Bret, from $\frac{1}{2}$ lb. to 4 lb.—Soles, from $\frac{1}{2}$ lb. to $3\frac{1}{2}$ lb.—Maiden rays, from 6lb. to 20lb.—Flukes, from $\frac{1}{2}$ lb. to 3 lb.; in such plenty, as to be sold from a farthing to three halfpence per pound."—*Llanelly*, 1807.

St. Bride's Bay.—"Gentlemen have their yachts sailing about this beautiful bay, abounding with turbot, soles, and dorees, supplying amply their own tables, and treating the public with the surplus at 6d. per pound."—*Mr. Fenton*.

Blackpool, in the eastern Cleddeu, has a great fishery for salmon and sewin.

Shell fish, are most abundant on the southern and south-western coasts of the limestone tract.

Oysters.—"Milford-haven yeeldeth most delicate, of severall sortes and in great abundance, being a commoditie much vented in many sheeres. The cheefest places of taking these oysters is at Lawrenny, the Pill, and the Crowe; the first of which is accounted the fattest, whitest, and sweetest; the Pill oyster, for that he is lesse washed with fresh water, tasteth more salte, and therefore more pleasinge to some, and is larger growne; and the Crowe oyster striveth with both for delicacie.

"Were it not that the Walflete and Gravesend oysters are better frinded in court then this poore country oyster of Milford is, no question but he would, and well mighte, challenge to have the cheefe prayse before them both: and I presume if the poet Horace had tasted of this Milford oyster, he would not have preferred the oyster of Circæi before this."—*G. O.* 1560.

"Oysters are an article of great value in Milford-haven and its neighbourhood; by giving employment to numbers of industrious people, at that season of the year when their labours are least wanted in the fields; and affording winter employment to many, who would otherwise be much distressed for the means of supporting their families. But for want of some regulations for the government of the oyster fishery, there is much reason to dread the breed will be totally destroyed; and that valuable resource of employment to the poor, and luxury to the opulent, be thereby cut off."—*Original Report of Pembr. in 1794.*

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"In various parts of Milford-haven are inexhaustible beds of oysters, of superior excellence, in such abundance, as to render them a cheap article of luxury."

"Llangwm, on Milford-haven, is famous for its oyster fishery: all the inhabitants of this little village derive their subsistence from them: they are small, and least estimable of the different sorts which Milford-haven produces: they are brought to Haverfordwest market, now by a late Act of Parliament as to oysters (other flat fish being also brought there) limited to a precise time, and sold at from 6*d.* to 8*d.* per hundred: besides vast quantities are pickled, in little barrels and jars, for Bristol and the interior: in this state they are most esteemed."—*Mr. Fenton.*

Tenby is called in Welsh, *Dinbech y pyscod* (the fishy Denbigh) to distinguish it from the town of that name in North Wales. The oysters of Tenby, Caldey, Stackpool, &c. are remarkable for their large size, but deemed inferior in quality to those of Milford. Of these large oysters, G. O. in 1560, says, "beinge eaten rawe, it seems too strong a meate for weake stomakes, and must be parted in two, three, or foure peeces before he may be eaten, by reason of his exceeding bigness, and are not counted so pleasing as those of Milford: they are therefore used in pyes, stueinges, brothes, fried, and boyled; wherein they are most delicate."

The limestone coast also of Gower, in Glamorgan-shire, abounds in oysters. Porth Einion, 16' W. by S. of Swansea, employs about 20 boats, four men to each, during the season: those of the Mumbles (*Ystum Llwynarth*) near Oystermouth, 5' S. of Swansea, are deemed the finest, and those of Porth Einion

the largest. When the fishermen return from dredging, the oysters are deposited, within low-water mark, upon beds which are pointed out by buoys; and when a sufficient quantity are got together, they are shipped off for Bristol, Bath, and the interior counties along the Severn. Dredging begins the 4th of August, which the dredgers keep as a festival: it being the Eve of St. James's, O. S.; that Saint may have formerly been considered as the patron or protector of fishermen.

The sea shore in Gower is in many places heaps of oyster shells, and the sands full of fragments of them, and broken and abraded limestone: but here, lime being so convenient, little or no notice is taken of these circumstances. Immense heaps of oyster shells are also at Llangwm, on Milford-haven: these, being more contiguous to the cold clayey soils of the coal tract, might be used to greater advantage.

Other fish abound on the coast of Gower, of the most favourite varieties. The lobsters are uncommonly large, 18 inches in length; and some, they say, two feet and more.

In consequence of such a vicinity from sea and rivers, the town of Swansea is supplied with the following varieties of fish: Turbot, bret, soal, plaice, flounder, skate, dorer, oysters, lobsters, crabs, salmon, sewin, mackrel, cod, hake, basse, whiting, horn-fish, mullet, gurnard, dog-fish, conger, eel, trout.

Notwithstanding these varieties, the inhabitants of Swansea and its vicinity, found it expedient of late to institute a society, and enter into subscriptions, for the better supplying the market with fish.

The *Severn Association*, instituted in 1811, for the better preservation of fish in that river, and its contributory

tory streams, was founded on the basis of sound policy ; and its members and agents have hitherto been active in punishing offenders against the statute ; in seizing, and rewarding the seizure of illegal nets, and other poaching engines ; and several cargoes, of fish out of season, have been seized, and condemned to be burned, in the market places of several towns bordering on the Severn.

Were such associations established within every province of the island, and their adopted measures pursued with vigour, the short period of three or four years would bring about a great reduction of price in this excellent article of provision : in places where salmon now sells for from 15*d.* to 2*s.* per pound, it might ere long be procured for less than half the money ; and of course in much greater plenty.

Two very illegal and exterminating modes of destroying fish, are practised by poachers, exclusive of a long list of inferior contrivances.

The *first* is the well known practice of spearing "with Neptune's trident" the salmon, &c. in their spawning season. The fish thus taken are of very inferior quality for food ; and the multiplication of the species must be also interrupted by the operation.

The *second* mode of destruction is practised, where lime for manure is laid down convenient or contiguous to brooks or rivers abounding with trout, and sewin, or salmon fry. The lime, in clods, is laid on the verge of a ford, just above pools and haunts of fish ; when slaked with water, it is shovelled into the stream, and the deleterious effect is soon visible ; scarcely a fry escapes within several furlongs of the place. The most common seasons for putting this scheme in execution, are when the salmon fry are somewhat grown,

and when those of sewin are in the same state. A very active magistrate in the county of Brecknock, complained of his being under the necessity of being an inactive spectator of these mal-practices, owing to the inefficiency of the present laws on the subject. A neighbour of his collected a hundred weight of fish and fry one morning, after the preceding night's liming operation; and yet he could not proceed against the offenders, but by the round-about way of indictment for trespass: and in this case, the offenders had fixed their laboratory upon the waste of a crown manor; which would have rendered the indictment still more tedious, and of more uncertain issue.

Were the Legislature to take cognizance of these crying evils, and render them at once statutable offences, two main points would be gained thereby;—that of increasing our store of provisions, by protecting the natural fund; and taking from idle vagabonds the precarious means of subsisting without useful labour. These modes of destroying fish, root and branch, are seldom or never undertaken, but by men of the worst principles;—so that any man may almost venture to say—“*shew me a poacher, and I will shew you a thief.*”

Two natural products of the sea coasts, may be included among the articles of luxury, rather than provisions:

1. *Samphire (crithmum maritimum)* corn cariw'r mór, or sea buck-horn; growing on rocks and cliffs not overflowed by the tides; gathered when not in blossom; boiled, and preserved, it becomes a good substitute for capers, and is much esteemed as a well known pickle.

2. *Laver (ulva pannonia)* sea liverwort; growing
on

on rocks and stones in creeks overflowed by the tides : it is gathered, and then boiled well ; put into jars, with the addition of only a little salt ; and sent occasionally as a rarity to distant parts. Thus prepared, it is called in Glamorgan, *bara lawr* ; in Pembroke-shire *llawean* ; in Anglesey *menyn y môr*, or sea-butter, and by the English, black-butter. Its flavour is agreeably aromatic or spicy ; though its colour to a novice is somewhat forbidding ; which made John Roderic, the Shrewsbury astrologer of 1700, when it was offered to him at a bardic congress at Pyle, in Glamorgan, to exclaim—" *Ai baw'r d—l, yw'r bara dú ?*"

After enumerating the various articles of provision common to this district, we have one *item* still remaining, before we conclude this Section ; and that is —*the number of meals a day.*

"Labourers are entitled to such a portion of the natural produce of their labours, as may be requisite to preserve and support their lives and healths : less than this, is not rendering to the labourer that hire of which he is naturally deserving ; and to portions that supply the artificial wants of intemperance, none in the eye of reason and justice can by any means, or on any plea, be entitled : and this principle admits of no limitation, even in favour of the higher classes : we can only admit that, consistent with civil liberty, no human laws can controul, or even interfere."—*Diogenes alter.*

Fashion varies in eating as well as in dressing. According to annotators on the Roman writers, that people eat but one full meal in the day, and that about our three o'clock ; the more frugal later, the more voluptuous earlier. A morsel of dry bread, of raisins, &c. was taken in the morning, to break fast ; some

taking it at eight, some at nine, &c. according to the craving of appetite.—*Kennet's Antiq.; Dacier on Horace, &c.*

In Wales, we have no vernacular terms at present, save for *two* meals: *ciniaw*, the morning meal, and *nawnbryd*, the evening meal*. Appetite was at length intored to require three meals a day; and the meals, and their names, breakfast and supper, we copied and borrowed from our neighbours.

G. O. in his History of Pembrokeshire, about 1560, taxes the descendants of the Flemings, in his time, with having “strangely altered their stomacke from the rest over the sea, for in that excess with which they are taxed for drinking, are these their kinsmen for excessive eating; for of custome they will have five meals a day; and if you will bestowe the sixth on them, they will accept it very kindlie; and if they be but a little intreated, they will bestowe labour on the seventh meale.”

In a few retired spots of Wales, inconveniently situate for the introduction of foreign customs, three meals a day is still the general allowance, given or required; and we have heard of some thrifty misers, who were in the habit of reducing their families to two meals a day, as soon as “the fern began to redden in autumn.”

* In some sequestered parts of South Wales, as well of North Wales, breakfast is called *ciniaw*; in Glamorgan Upper, dinner is called *ciniaw echwydd*, and Meirionydd, &c. in North Wales, *nawnbryd*, and tautologically, *pryd nawn bryd*. In the modernized parts of Wales, *ciniaw* is now solely applied to the noon-meal, or dinner. *Cwynos* occurs as a stated meal in the Welsh laws, and in the Triades; and has been rendered by translators, *supper*. *Coan*, in the Armonican dialect, means a meal, probably from *cwyn*, the craving of appetite: then *cwyn-naw* (*ciniaw*), the nine o'clock, or morning meal; and *cwyn-nos* (*cwynos*), the evening, or night meal. *Cwynos* is now, and long since, an obsolete term.

The custom of more than three meals a day, began during the labour of harvest work; when bread, cheese, and beer, were given as "*baits*" between meals; about ten in the morning, and five in the afternoon. From harvest time, the custom inadvertently extended itself to the longer days of spring and summer; and now it engrosses the whole year. At first, "*baits*" was a proper term for the supernumerary meals; now, there is scarcely any difference, as to time and quantity, between the modern baits and the ancient meals; in fact, they are five meals, and in some places six. It is not intended that it should be inferred from hence, that the aggregate quantity of provisions consumed in the 24 hours is greater by five than by three meals; for *three times ten*, and *five times six*, amount equally to *thirty*.

What farmers complain of, under the present pressure of high rent, taxes, and wages, is the great loss of time, by five or six meals; and—that after a "heartly sitting bait" at ten o'clock, appetite cannot possibly be ready for a dinner of boiled meat and vegetables, by twelve or one o'clock; the consequence being, that most of the vegetables, cabbages or potatoes, usually consumed under the old system, now remain untouched, and go as waste, dressed and prepared for human food, for the hogs, &c.

A kind of remedy for this would be, to change the hour of dinner on boiled meat and vegetables, from twelve or one to the earlier hour of *ten*; and if appetite could not possibly be so keen by the baiting hour of twelve or one, on bread and cheese, the farmer would have no cause to complain. The worse of this change of the hour of dinner to ten o'clock, would be, that it would interfere more inconveniently with the
opera-

FUEL.

rations of the dairy, &c. in families where few female servants are kept.

Among farmers, in parts of Caermarthenshire, &c. found a common custom of boiling meat, and eating it hot, for supper; the remainder cold for next morning's breakfast; and spoon meat only for dinner. This is reversing the common order of fare; but we must leave it for physiologists to determine, which is the best mode adapted to the human constitution, economy, and labour.

In the northern parts of Pembrokeshire, there is a practice rather singular as to the hours of labour. The labourers, from May-day till corn harvest, come to work at sun-rising, and quit at sun-setting; during the day, they take the usual time at breakfast, and at twelve is called a *nooning*; that is, two hours sleep from twelve o'clock till two; they then eat their dinner and continue their labour till sun-set."—*Mr. Jessall, in Pembrokeshire*, p. 26.

"*Heath*, groweth in the mountaines of a great hight, and is pulled up by the rootes, by poor people, and serveth for fier; as well as for meate for cattell when the hye mountaines are coveryd with snow, and nothing open but the topps of this heath. I have heard that this kinde of heath, being cut in somer and made in ricks, is the cheefest and sweetest fuel for dryeing of mault, therein passing both wood and strawe."—1560.

"Ever since I read what my author advances respecting the *heath*, I have employed it for the purpose he recommendeth; and am assured that he doth not speak of it in higher terms than it deserveth; as the ale, brewed from malt thus dried, has a colour and flavour peculiarly fine, and imbibes from the fume a subtle quality which causes the liquor to be much more diuretic than that which is produced from malt made in the ordinary way, and highly efficacious in gravel complaints." "*Probatum est.*"—Mr. Lewis, about 1700.

Fern.—"The ashes of fern in North Wales, is beginning to be an article of profit, and is used in the composition of soap. But in Pembrokeshire, we are very slow to adopt schemes of advantage, and of this commodity we make nothing in general: indeed of late, I use nothing but the *smoke of fern* in a *red-herring* work I own at Fishguard; which I find to be superior to any other in curing the fish, as on that account they have the preference at market."—*Ditto*, 1700.

At present, and for many years back, the two principal, and almost exclusive fuels of the district, are *peat* and *coal*: of these in order.

Peat

Brecon Canal: but Cardiganshire has scarcely a prospect of being relieved by any other means than the annihilation of the *coal tax*.

In the thinly inhabited mountainous parts of the district, where the consumption is the least, the store of peat fuel is the greatest, yea inexhaustible; some large parishes having from four to seven thousand acres of heath and turbary, as a public stock, which in cases of enclosure are in part appropriated to that purpose. In some places the lords of the manors exact an annual chiefly for permission to cut the sod.

Products and Quality of Peat Water.—Peat-mosses occasionally afford *petroleum* in small quantities; and *crocus martis* might be collected in some places. Peat water is also indued with the principle of *tanning*. In the year 1811, a man cutting peat for fuel in the parish of Gwnnws in Cardiganshire, at the depth of two feet below the sward, discovered a man's body decapitated, the skin in perfect preservation, containing the bones like sticks in a bag, as the whole of the muscles, viscera, &c. had disappeared: the bones were, within and without, as black as ebony, but considerably softened. As much as was found of the corpse was deposited in the church-yard at Ystrad Meurig, without a coroner's inquest, for it was sufficiently apparent that murder had been committed, by "some person or persons unknown."

This tanning principle accounts for timber trees, not only oak, but pines and other soft wood, being much better preserved in peat-mosses than in any other soil or water: trees deposited at a considerable depth are very black internally as well as externally; and the wood, for its colour, was formerly much used by joiners in veneering. The wood preserves its toughness and cleaving quality

quality as well as if newly felled; and is generally better adapted for lathes, than any other purpose, as the grain has not that closeness that is required in boards, &c. for cabinet-work.

Peat water has also the effect of accelerating the transition of stones; grey rock stones, hornblende, slate, &c. having lain in bogs, for a certain period, have the appearance of sandy whetstones, and are used as such; though no sandstones in mass are found any where in the vicinity.

Some years back a piece of shode galæna ore, about half a ton weight, was discovered in cutting fuel in a flat turbary called *Cors y Bleiddiau*, north of Tre-Garon in Cardiganshire; of course this led to some expense in endeavouring to trace the bed of ore in the vicinity of the bog.

Use of Peat in Manufactures.—"There have been great proffers made by men of experience, to bring this kinde of fuell to be very commodiouse for the realme; and, as I have heard, some have obtained a monopolie of the same as to turn it to chark cole, to make it burn without annoyance; but what success it taketh, I have not learned, yet I am persuaded it might be brought to far greater perfection than it is as the common people now use it, for I have heard that in some partes of this realme, it serveth for iron workes; and in Cardiganshire it is said that the smithes work with them: but if by the industrie of some good and well practized man, it might be brought to any good perfection, doubtless it would prove very beneficial to the whole commons of this country, for that the mountens do yeald thereof such plentie as would ever serve and continue. Guicherdyn, in his description of Holland, commendeth this as a principal, and the seconde cheeffe commoditie of that province;

FUEL.

vince; that the custome thereof payd in one towne
y amounteth in the yeare to 3000 ducats to the king
paine."—*Hist. Pembr.* 1560.

Cardiganshire is one of the most rich and extensive
ing fields in Britain: many of its veins were opened
worked by the Romans; and great numbers have
worked in modern times, as deep as they could go,
such level mines as were easily obtained to drain
water. When these rich veins are opened again,
well explored, valuable treasures will be found in
t of the old soles below the levels, by which they
e formerly worked, as well as new ground, in dif-
nt places in the course or bearing of those veins. As
t of Cardiganshire is a hilly country, consisting ra-
of ridges of a moderate height, with narrow val-
between them, than of high mountains,—rivulets
runs of water may be collected and led to proper
ces, and reservoirs may be made for keeping quan-
s of rain water, for working powerful *hydraulic*

ration of the moss; and nothing but the black heavy peat should be prepared for use. The heavy black peat, which is of a close and solid substance, cannot be thoroughly and perfectly dried in one year; but when two years old, and well prepared, well thatched or housed, they make a strong, clear, and durable fire, little inferior to good coals, and even better than such as are but indifferent. Steam-engines may be effectually worked with the black peat, without any material alteration in the construction of the machine, excepting that the furnace may be a little wider than for pit-coals. For such mining countries as Cardiganshire, engines consuming the least quantities of fuel, ought to be preferred."—*Williams's Mineral Kingdom*, Vol. I. 410, 1st edit.

"*Pit-turf* is advantageously used in Lancashire to smelt the iron ore of that county. Mr. Wilkinson, brother-in-law to the celebrated Dr. Priestley, and himself not less famous for his extensive undertakings in the iron-works, perhaps the greatest in all Europe, makes use of pit-turf in his large smelting furnaces of that province."—*Annotator of Cronstedt's Mineralogy*, 1780.

We are aware that some smiths, in our time, have used soaked peat, in places the most inconvenient for coal; but as soon as passable roads were opened to the coal-pits, though at the distance of at least 40 miles, yet no more peat was charred for the smithies: and if Mr. Wilkinson ever used peat in his Lancashire furnaces, yet we are persuaded that he had some motive for it exclusive of profit.

For domestic fuel, as used at present, the fund of peat is inexhaustible; for when cutting fuel at one

end of the mine, the other deserted end is accumulating, and so on, in perpetual succession: but peat is too widely diffused over the country, and too speedily reduced in quantity within any convenient distance, ever to be considered as a competent permanent pabulum for such voracious volcanoes as blast furnaces and steam engines. Peat also, on wastes, is considered as a public stock, and every householder in the township, parcel, or hamlet, claims his portion thereof; and these appropriated portions will not be readily surrendered to the monopoly of machineries.

2. *Coal* has been very anciently used as a fuel in Britain. According to Mr. Pennant, a flint hatchet, an instrument of the Aborigines of our island, was discovered stuck in a certain vein of coal, exposed to day, at *Craig y Park*, in Monmouthshire. Some collieries are noticed in the "Extent of Wales," a Survey made in the 23d year of Edward I. The ancient bloomeries we reserve for the Section on Manufactures.

Coal is, in Welsh, termed *Glo*; so in Cornish and Armoric. *Mynydd y glo* (coal-hill)—*Glo-bwll* (coal-pit), &c. occur as names of places, even in the slate tract, where nothing more than a fruitless attempt to discover coal, could have given occasion for such names.

Coal, and its accompaniments, ironstone, and limestone, have been fertile sources of wealth within the tract coloured *dusky*, in the perfixd Map of the district. Few tracts afford more ample or more curious subjects of investigation to students in geognosy; for
professors

professors in that branch of science have not yet appeared; the theories and systems of the most confident writers being no other than imperfect essays: and most probably before a complete system can be established, the students, and the subject of their study, the globe, with its furniture, external and internal, will be no more. However, in the mean time, it is incumbent upon us to collect matters of fact, as to appearances of things, within that little space under the surface of the globe, with which only we can possibly be acquainted; for such observations on stratification, &c. are useful, and even indispensable, in the prosecution of mineral researches, arts, and manufactures: letting the arcana of primitive formation, known only to the Great First Cause, remain with such desiderata as the philosopher's stone, perpetual motion, &c.

The infidel doctrines of "*subsession*," broached by Buffon, and afterwards in a newer form supported by Hutton, De Luc, &c.—"that light, bituminous, fuligineous matters, vegetable or animal oils, subsiding through the waters of the ocean; *i. e.* lighter bodies subsiding through the heavier! should form *coal*," says a late writer*, "have been combated by several ingenious authors; but those which respect the origin of coal, have been attacked by no one more successfully than by Mr. Williams, in his History of the Mineral Kingdom." This reminds us of a promise we made, in treating of chesnut wood, in Chap. X. of giving, in this Section, a biographical sketch of that esteemed writer.

* Berrington.—*Query?*

FUEL.

John Williams was born in the parish of Kerry, in Montgomeryshire, about the year 1732. His education was not higher than reading and writing a little English in the village school. The operations of husbandry not being adapted to his innate genius, he quitted his native country before he was full grown, and was no more heard of there, until he had settled as a mine-surveyor in Scotland. It appears probable, from his being well acquainted with the Cardiganshire mines, as he himself says, "about 40 years" before he printed his Mineral Kingdom in 1789, that he spent some time as an apprentice in the subterranean art, where Myddelton, Bushel, and Pettus, had in their turns exercised their respective talents in mining. Miners are more migratory in their dispositions than most men; and the author, having informed himself of the principal mines in Cardiganshire and North Wales, passed through Derbyshire into Scotland, where he married,

the Venetian territory, to give his opinion of the mineral wealth of the Count's estates. In his letters from Venice, Verona, &c. to his nephew, Mr. John Williams, of Kerry, in Montgomeryshire, he seemed to be in raptures of admiration at the stupendousness, magnificent scenery, and stratification of rocks, in the Tyrolese Alps; and in sanguine expectation of a plentiful harvest of mineral wealth in the states of Venice. In his last letter to his nephew, dated Easter Monday, 1794, he seemed embarrassed at the Count's conduct towards him, in not following him according to his contract, nor supplying him with necessary means and instructions. Soon after the date of this letter, he is supposed, by his relatives in Wales, to have died at the Count's house in Venice, from whence he had dated some of his letters.

Since his death, his History of the Mineral Kingdom has undergone a second edition, with additions by Dr. James Miller, of Edinburgh, which we have not seen. The style of the first edition has been blamed by many, for its tedious redundancy; but some allowance ought to be made in this respect, when men of natural abilities, without the aid of early education, undertake to write upon difficult subjects: however, his work will remain a lasting monument of his abilities and perseverance, as long as Englishmen shall have mines of ores and collieries to explore; notwithstanding the cavils of inferior talent. Above all, his ardent adoration of the wisdom and goodness of the Supreme Being, breathed in the spirit of true piety through all his work, must endear his character in the mind of every believer in revelation. In this respect, we cannot bestow a higher panegyric upon him, than by quoting the concluding paragraph in his preface, to

which he had been led by Dr. Hutton's result of his enquiry into the Eternity of the World :—"we find no vestige of a beginning, no prospect of an end !"

" Thus, (says the author of the Mineral Kingdom), our modern philosophers labour hard to confirm their favourite scepticism, &c. by all possible means ; or, in other words, they labour hard to rob us of our best inheritance, both here and hereafter ;—to sap the foundation of our belief in revelation, and of the superintending care and love, and of the over-ruling providence of the all-benevolent, all powerful God, our Saviour, who cares for us, and upholds us through all the stages of our existence ;—and like actual robbers, these philosophers give us nothing in exchange for our natural inheritance. If they say that we are poor mistaken ignorants, and that they wish to convince us of our error ;—this is worse than nothing. If we err in charity, let us live and die in error. It is more happy to live in a full persuasion—in a feeling sense of the love of God and man, while here—and in the confident hope of eternal felicity hereafter, than to suppose that there is no such thing—that these divine faculties and propensities of our souls, which make us capable of loving God and man—of admiring God in his works, and of ranging through his creation with sublime delight—shall perish for ever, and sink into the horrible gulph of *non-entity*. Let us turn our eyes from the horrid abyss, and stretch out our hands, and cry—Save, Lord, or we perish !"

The first written document, that we know of, respecting the *coal tract of South Wales*, is that in the MS. History of Pembroke, by G. O., in the reign of Elizabeth, and published for the first time in the Cambrian Register, in the year 1799. This early author had

had the merit of tracing accurately, the two parallel series of coal seams, running between the northern and southern barriers of limestone, from St. Bride's Bay on the west, into Monmouthshire on the east: but in common with others of much later date, he traces a connection between the Monmouthshire coal and limestone and those of Gloucestershire and Somersetshire; which is since found to be an error; as the coal tract of South Wales is perfectly isolated.

From the above period, to about the middle of the 18th century, the fuel of this coal tract did not blaze so as to throw sufficient light upon its internal treasures: at the latter period, its advantageous offers of coal and ironstone attracted the attention of capital and skill; numerous blast furnaces and other machineries were progressively erected; and the anatomy of its unexplored mountains, was by degrees pretty accurately ascertained.

We received the first rudiments of the natural history of this tract, orally, from the late Rev. Mr. Evans of Llanelly, in the year 1805: by him we were informed of the varieties of coal it contained; that the series of coal seams, bearing eastwardly from St. Bride's Bay to Clydach in Brecknockshire, there wheeled or veered round to Pont y Pool, in Monmouthshire, and thence continued the eastern curve into Glamorganshire, where the southern series of coal seams front those of the northern series, and apparently indicate a junction near the central line of the tract, which he called the "Saddle." This central longitudinal line, or saddle, of course covers the greater number of seams, and the greatest depth of coal within the tract.

Mr. Evans thought that the southern and northern ranges of limestone, dipping contrary to each other,

FUEL.

, or came in contact, under the central line of the tract: of this, however, we have a different opinion, hereafter to be given: he did not know that the thickness of the coal measures had been ascertained; though he was acquainted with 25 or 26 different kinds of coal, at various distances, regularly stratified with the intervening measures.

In the year 1806, Mr. Edward Martin, of Morris-
ton, near Swansea, mineral surveyor, a person well
qualified from his profession, and experience in all
parts of the tract, drew up a concise but very clear
Description of the Mineral Bason in the counties of
Pembrokeshire, Glamorgan, Brecon, Caermarthen, and
Swansea; with a map and plan of the "bason;"
which were communicated to the Royal Society by
Right Hon. C. F. Greville, F. R. S. This com-
munication was published in the Phil. Trans. 1806,
vol. XVII. p. 324: but as no more separate copies
were printed than served the Members of the Society,
there was under the necessity of applying to a worthy

ourselves with our usual appellation—the *South Wales coal tract*.

2. *Situation*.—"Glamorgan engrosses far the greater portion of coal and iron ore; Monmouthshire the next in point of quantity; Caermarthenshire the third; Pembrokeshire the fourth; and Brecknockshire possesses the least."—*Mr. Martin*.

3. *Dimensions*.—"The length of this basin is upwards of 100 miles; and the average breadth in the counties of Monmouth, Glamorgan, Caermarthen, and part of Brecon, is from 18 to 20 miles; and in Pembrokeshire only from three to five miles."—*Mr. Martin*.

Our only objection to Mr. Martin's delineation of his "basin," is at its western exit on the verge of St. Bride's Bay, where it makes too rapid a curve to the north; for were his delineation at this point true, coal would again be found on the promontory north of St. David's: this not being apparently the case, in our delineation of the coal tract (*see Map*), we have widened the handle of Mr. Theoph. Jones's "marrow-spoon" farther south, towards Walwyn's Castle; and so, its continuation, under St. Bride's Bay, leaves St. David's Point to the north, and takes in the southern part of Ramsey Island, where, according to Mr. Fenton, are symptoms of coal.

4. *Bearing*, *i. e.* longitudinal course; *inclination*, *i. e.* latitudinal dip; of coal seams and measures.

Having noticed the appellations "basin," "marrow-spoon," &c. we will indulge fancy a little farther, and give our coal tract a new term, the *mineral tree*: its root, on the eastern curved base, is at Cwm Brân, somewhat to the south of Pont y Pool, in Monmouthshire;

shire; from hence, the dextral* strata, bearing north to Blaen Avon and Clydach; and the sinistral strata, bearing south-west to Risca; all rise to the eastern points, and, of course dip to the western. These strata form the lower stem of the mineral tree.

On the north side of the tract, from Clydach in Brecknockshire, to Llandebie in Caermarthenshire; and on the south side, from Risca in Monmouthshire to Llan Madoc Point, on Burry harbour, in Gower; the bearing of the strata is nearly due west.

Every tree (in botany) has a point, visible in the transverse section, called the *heart*, which forms a line more or less central, the whole length of the trunk: the heart of this mineral tree, following a line far from central, proceeds from its root in Monmouthshire, to the river Romney, Cefn Hengoed, Ystrad Dyvoddwg, crosses the Neath river near Cadoxton, to about the tenth mile-stone from the head of the Swansea Canal at Hen Neuadd, to Llangennech, and to the centre of Pen Bre Hill, north of Llanelly in Caermarthenshire. On the north of this central line, or "saddle," all the strata rise to the north; and all the strata on the south side of the same line rise to the south; and both series dip at right angles to their respective crops, bassets, or risings; so as to indicate a junction of the strata of the two opposite series either in a curve or an angle, more or less acute, under the line of demarcation, or the heart of the mineral tree.

This second compartment, with the eastern stem already described, form the grand trunk of the mineral tree.

* *i. e.* The strata on the right hand of a viewer, standing east of Cwm Brân, with his face to the west.

On this trunk, about 17 or 18 miles broad, from Llan Madoc Point on the south, to Llandebie on the north, is grafted, as it were, the western end of the mineral tree: both series of strata, and especially the northern, wheeling or veering so considerably towards the heart, or central line, that by the time they have emerged from the sub-marine excursion under Caermarthen Bay, a space of about 20 miles on the southern line, and landed in Pembrokeshire, the diameter of the contracted trunk is scarcely more than five miles; and the dip of the strata henceforward to St. Bride's Bay become more considerable, so as in some places to be nearly vertical; and from that point to 70, 60, 50, and 45 degrees. The dip of the strata in the grand trunk, or east of Caermarthen Bay, is also various, from the angle 45° to one yard in three, six, nine, and twelve; the latter, upon an average, being the nearest approach to the horizontal. Along the line clustered with iron-works, on the northern side of the trunk, from Hirwaun furnaces in Brecknockshire, to Merthyr, Sirhowy, Beaufort, Clydach, and Blaen Avon, the dip is pretty steady at one yard in twelve; the coal roofs are also stronger than in most parts of the tract; two circumstances of material importance to the lessees of the mines. The strata continue their regularity, with the exceptions of a few faults, from which but few coal fields, if any, are exempt, from Clydach and Blaen Avon furnaces, round by Pont y Pool, to the root at Cwm Brân; and here, regularity of stratification, or any thing like it, seems to be at an end; for from hence southward, irregularity and confusion of strata frequently prevail. This division between order and chaos, led us to fix this point near Cwm Brân as the root of the mineral tree, in preference to Pont

FUEL.

ty Pool, though the latter has the greatest claim to centrality.

From Neath river, westward, to Caermarthen Bay, the strata of the southern series are more regular than those opposite to them on the north: from Neath, eastward, the case is reversed; for in the southern series the dip of the strata is more considerable in some, and more irregular in most places, than those opposite to them on the north side: the roofs of the coal are, in most places, more fragile, no use is made of the stone, roads are intolerably bad in wet seasons; the profits of course, bear no comparison with those of the opposite series, the Lydia of so many Cræsus. *Faults.*—"Slips, dykes, gashes, and other accidents, are not improperly called *troubles*, by Scots collectors."—*Williams's Min. Kingdom.*

In many instances, the due range of the strata is locally thrown out of course, in consequence of knots, or faults; which are not confined to the edges

were the strata to keep the same dip, &c. without any interruption or breach of regularity."—*Williams's Min. Kingdom.*

Of this advantage sometimes gained by faults, we may instance a case in point:—In pursuing a seam of coaking coal, six feet thick, called Greenway vein, on the Gnoll or Crongell property, near Neath in Glamorganshire; under a depth of strata of 111 feet, the coal was lost all at once in a dyke, or fault, of rounded stones or pebbles of unknown thickness; but in sinking a well below, near the Abbey Bridge, the Greenway vein was again found, within 18 feet of the surface.

Another dyke near Neath, was bored into as far as 216 feet, and then abandoned.

At the line of demarcation between the northern and southern series of coal, on the Swansea Canal, in Glyn Tawy, the seams of stone coal, on the north of the line dip into a dyke or fault, which apparently separates them from the binding and coaking coal seams on the southern side.

We were informed that coal measures, in many instances, curve upwards when they approach and strike against a fault, &c.:—"In the Aber Crav Colliery, near the head of the Swansea Canal, a bed of black shale, containing iron ore, becomes brown in colour; and, in common with the other measures, *curves upward* in approaching a fault; and the coal seams, &c. are not known to be found nearer than the Valley of Neath, on the opposite side of a hill, called Hir Vynydd."—*Mr. Harper.*

This curving is in the dip, or at the base of the strata, whose inclination towards the south is upon an average one yard in six: similar curvatures occur at the
the

the crops or bassets of strata, where they meet with opposition.

In examining into the coal strata between Llanhary, in Glamorganshire, and the "saddle," or line of demarcation, we were informed by Mr. Rees, of 12 distinct seams of coal, hereafter to be defined: the 11th bed, called Cribwr vein, of eight feet coal, the lowest but one that he was acquainted with, curved upwards for six or seven yards, before it met a breccious transilient limestone rock. We examined this spot in particular, bearing that they sunk through limestone into coal, which we considered as an uncommon phenomenon. We found a pit sunk through 54 feet of this protruding limestone; and under about 11 fathoms more of clay, clunch, and iron mines, is the Cribwr vein of eight feet coal: but here, the limestone is not to be considered as a regular roof of coal, being only accidental; as the limestone dips south, under the white limestone of the Vale of Glamorgan, and the coal measures dip north towards the "saddle" of the tract.

6. *Species.*—The coal of South Wales is of three kinds, called *binding*, *coaking*, and *stone* coal.

1. *Binding* or caking coal is called by the Welsh, *Glo rhwym*, from its *binding* quality; *glo rhing*, probably an abbreviation of the English *running* coal; and *glo cwtwm*, from its caking in a *notty* mass; though now, and for centuries back, *glo cwtwm*, (*culm*) is generally applied catachretically, to the dust or refuse of the stone coal of Pembrokeshire, and the western end of the grand trunk, in the counties of Caermarthen, Glamorgan and Brecon*.

This

* *Culm*, in the vulgar vocabulary, became at length applied to all refuse coal, indiscriminately: this led to abuses and fraud; and at length

This coal seems to have been analyzed by Mr. Kirwan, under the name of "*Swansy coal*." Swansea exports the three species, to which it has convenient access, by means of the canals: however, the component parts of the specimen analyzed, viz. 73,53 of carbon, 23,16 of a mixture of asphalt and maltha, in which the former appeared to predominate, prove it to have been of this binding species; which appears to be nearly allied to Williams's "cherry coal" of Scotland, and to Farey's "crozling coal" of Derbyshire, &c.

Exterior Character.—Though this coal is the most regularly stratified of these three species, yet its varieties of stratification are numerous. Its strata in the great are in lines parallel to the roof and floor; and those strata consist of numbers of slabs closely cemented together, and sometimes alternately varying in construction from the plane slaty to the diagonal, and the diagonals reversing each other, like herring-bone masonry: some slabs or layers from half an inch, to two or three inches in thickness, vary in fracture, wavy, curly, splintery, &c.: but the fracture of the best samples is commonly hexaedral, in small cubes, parallelopipeds, &c.; so as frequently to exhibit the dicy appearance of galæna, or potter's lead ore.

Quality.—Of the two bitumens, asphalt evidently predominates, which makes it slower in kindling, but of longer duration: when thoroughly heated, it cakes,

to a hearing in Westminster-Hall, where it was judicially, as well as judiciously, decided by Lord Ellenborough, (*N. W. v. Newcastle*), that in future the term *Cuin*, should be applied only to such refuse coal as does *not* kind or cake in burning: this includes two, out of the three South Wales species of coal.

coheres in a mass, even the slack or dust of it; and rich coal, asphalt is seen oozing out like tar, or fluid pitch: it emits thick volumes of whitish smoke, which acts as a conductor to the flame, and they alternately caper from one point of the surface to another: it is extremely fuliginous, and causes more work for chimney-sweepers, than any other coal: in a certain state of combustion, the asphalt, reduced to soot, ascends and hovers in the air in the shape of musicians' potters, which are vulgarly called *blacks*, and soil every thing they light upon: these hovering particles contribute materially to the character of the London smudgies, where one of the most bituminous varieties of coal is generally used. Notwithstanding its filth, this coal is a strong durable fuel, and smiths prefer it to any other, for obvious reasons, as its heat concentrates about the iron: two tons of this coal will do more work in a smithy, than two tons and a half of a

"One hundred parts of the best English coal give, when charred, 63 of coaks."—*Mr. Jars.*

"The residuum of the best English coal, distilled, amounts to 73 per cent."—*Mr. Hielm.*

"Dr. Watson found the residuum of the Newcastle coal only 58 per cent."—*Mr. Kirwan.*

Even the latter quantity is too high for the combustion of this coal in the open air. At Merthyr Tudful, where the coaking coal is universally used, the coal is allowed to be reduced "about one half," or 50 per cent. At Cyfarthfa, 13 tons of coal yield $13\frac{1}{2}$ dozen barrow-loads of coak, each barrow 3cwt. which reduces the quantity below 49 per cent.

Maltha, the predominant bitumen in this coal, being more volatile than asphalt, the coal is sooner reduced to coak, with less diminution of the carbonaceous part; which accounts for its producing one-third more coak, and being a quicker fuel, easier kindled, and sooner consumed. It does not cohere in burning, its cinders will not re-kindle; and its dust, running through the grates, was thrown away until lately. This coal-dust or slack was tried, tempered with mud or clay, and made into pellets, like the Pembrokeshire culm; but the experiment did not succeed. Powdered lime and water mixed with the coal-dust, and made into a paste, resembling mortar, succeeds well; and makes a lasting auxiliary fuel in the rear of the grate, with lumps of coal in the front. This addition of lime to coal-dust, we noticed among the economists in Swansea and Merthyr Tudful.

This coal is called in Welsh, *Glo yspagog*; from *yspôg*, a claw, or talon; its surface frequently exhibiting converging radii promiscuously directed, similar to some specimens of zeolite and asbestos. It

is more nearly allied to the second variety of the second family of Kirwan, than to any other coal he described.

We do not know that coaking in close hearths, as practised in Derbyshire, &c. has been adopted in South Wales.

Stone Coal is commonly called in Welsh, *Gloed*, hard coal, from its not soiling the fingers, and flaming when ignited. It is nearly the reverse of *stone coal* of Scotland, but seems to agree in every particular with the species called in that country *blind* *l*; and with the Kilkenny coal of Ireland, which, Kirwan takes for granted, "consists almost entirely of pure carbon;" having neither asphalt to se smoke, nor maltha to kindle into flame.

We will quote the ancient, as well as the modern, historian of Pembrokeshire, for several particulars respecting this coal.

"This cole is a ready fiere, and very good and ete* to rost and boyle meate, and voyde of smoake, ere yll chymneys are. It is called stone cole for the diness thereof, and beinge once kyndled giveth a water heate then light, and deliteth to burne in darke ces: it servith alsoe for smithes to worke with,

noysome for the smoake, nor nothing soe loathsome for the smell as the *ring* cole is, whose smoake annoyeth all thynges neare it, as fyne linnen, mens hands that warm themselves by it: but this stone cole yeeldeth in a manner no smoake after it is kyndled, and is soe pure that fyne camericke or lawne is usually dried by it, without any staine or blemishe; and is a most proved and good drier of mault, therein passing woode, fern, or straw. This cole, for the rare properties thereof, was carried out of this countrey, to the citie of London, to the lord treasurer Burley, by a gentleman of experience, to shewe how farre the same excelled that of Newcastle, wherewith the citie of London is servid; and I thinke, if the passage were not soe tedious, there would be greate use made of it."—*G. O.* 1560.

"The fuel principally used here is *culm*, (the small, or refuse of stone coal), which is brought from Milford-Haven and Bride's Bay, the price of which within these few years is much increased: yet considering its general usefulness and durability, it still may be esteemed a cheap fuel; as it stands a man, on an average, brought home to his door, no more than 1*s.* 10*d.* per barrel*; a sum, which the making, that is, the reducing it into compost with clay, may raise to 2*s.* 1*d.* In commendation of the excellence of this species of fuel, too much cannot be said, particularly as not productive of smoke, for culinary purposes, the malt-house, and the laundry: nor does it require that constant pabulum which other fires do; as, made up in the morning, it is known to endure a whole day, without renovation; and, besides, like the vestal fire, is never

* The same as the Irish barrel of 40 gallons.

FUEL.

immability. Not having seen it, and our informant having never seen cannel coal, it must remain a subject of enquiry, whether this *lantern* coal be a cannel or not? We know an instance in Denbighshire, where cannel coal rides upon binding coal, both cunions, but in a direction the reverse of each other. The position of the lantern coal is about 18 fathoms below the Llanbedr or Meiros vein, and about the same space above the Leimog or Bryn y Cae vein, in the parish of Llanharan, Glamorganshire :—southern coasts.

2. "There is coal cast by the sea about Newport, Monmouthshire : poor people gather it, and sell it. Tradition says, that the lord of the manor laying an imposition for every bushel of coal so gathered, there was no coal to be found during the three years the imposition continued ; but when abolished, it returned in great plenty, as it now continues."—*Letter from*

found in the river Conway, in North Wales: what could give rise to this fable we know not, unless the cargo of a foundered coal-vessel should be gradually driven up the river by the agency of the tides.

7. *Loco-position of the three species of coal*:—The binding coal (1st species) occupies the eastern strata, and those which curve northwardly to the iron-works of Pont y Pool, Blaen Avon, and Clydach; and thence westwardly to Nant y Glo, Ebwy Vale, and Beaufort iron-works; thence to Sirhowy and Tredegar iron-works, where the coal commences its state of transition, from its binding quality to that of coaking coal (2d species).

The transition advances westward of Sirhowy, so that at the Union or Blaen Romney (Rhymni) iron-works, at the junction of the three counties of Monmouth, Brecon, and Glamorgan, the coal is of the perfect coaking kind; and continues so, onward, to the iron-works of Dowlas, Plymouth, Pen Daron, Cyfarthfa, Aber Dâr, and Hirwaun. About the latter place, the coal is a second time preparing for a transition from coaking coal to stone coal (3d species).

Between Hirwaun and the river Neath, the transition is completed; and thenceforward, for the space of about 70 miles, to St. Bride's Bay, on the coast of Pembrokeshire, the northern series consist entirely of stone coal.

The southern series in Pembrokeshire, consist also of the same kind of coal; the county having no bituminous coal within it. The southern series of stone coal ends somewhere under Caermarthen Bay; for on proceeding eastward, and landing on the coast of Gower, in Glamorganshire, stone coal is no more to be found; the 1st and 2d species, both bituminous, continuing from thence, in separate beds, all the way,

bout 50 miles, to the root of the mineral tree in Monmouthshire, where we began to trace the loco-position of the species.

Stone coal occupies the whole series, northern and southern, within the limits above described.

Coaking coal occupies the whole of the northern series from Hirwaun furnaces to those of Sirhowy, excepting a few of the upper strata, which consist of binding coal.

Binding coal occupies the whole of the northern series east of Sirhowy.

Coaking coal is a medial link, in the three several circumstances of loco-position, properties, and external character, between the two extremes of *binding coal* on the east, and *stone coal* on the west.

This regular and gradual transition from one species of coal to another, is in the longitudinal line of bearing from east to west; and not in the transverse line of dip or inclination from north to south.

The strata of coaking coal from Blaen Rhymni, in like manner dip under the surface strata of binding coal at Rhiw Cymmrwg.

2. *Llantwit, Vaerdre* (Southern Series).

		<i>Ft.</i>	<i>Ln.</i>
Binding Coal	{ Maes mawr vein,	3	6
	{ Maes bach, ditto,	2	6
Coaking Coal—Fforest vach, ditto,		3	

3. *Crongell, near Neath*, (Southern Series).

	<i>Ft.</i>	<i>Ln.</i>
Coaking Coal—three upper beds,	15	0
Binding Coal—two lower beds,	7	10

4. *Bryn Coch, west of Neath*, (Southern Series).

	<i>Ft.</i>	<i>Ln.</i>
Binding Coal, upper seam,	3	6
Coaking, second coal,	4	6
Coaking, third coal,	6	0
Binding, fourth coal,	5	0
Binding, fifth coal,	4	0

8. *Mode of working or raising coal*: first, in Pembrokeshire in the sixteenth century.

“The diggin of this cole is of ancient tymes used in this countie, but not in such extent and skilfull sorte as now it is; for in former tyme they used not engins for lifting up of the coles out of the pit, but made their entrance slope, soe as the people carried the coales upon their backs along stayers, which they called *land-ways*: whereas now they sinke their pitts downe right four square, about six or seven feet square, and with a wyndles turnid by foure men they draw up the coles a barrell full at once by a rope: this they call a down-right doore. The lordes of the land have eyther
rent,

FUEL.

t, or the third barrell, after all charges of the
rke deducted."

' The cole is first found by a small appearance
reof, which they call *edge*; which being found,
y search which way the veyne leaneth, and on the
trarie side they begin to sinke, for the cole is found
lye slope in the ground, and seldom downright.
e cole beinge found, the workmen follow the veyne
rie way, untill it ende, or be letted by water or
ke. The veyne will not be for the most parte
sing five or six foote deepe, soe that the cole is
ried stooping; for they commonly leave a foote of
e in the bottome undigged, to serve for a strong
ndation, except they finde the rocke under foote,
ich they call the *doonstone*, which, if they finde,
n they dig cleane all the cole, and further then
t stone they looke for noe cole: and over head they
driven to tymber their worke, to keep the earthe
n falling, which is chargeable, but in some grounds

boyes that beare the coles in fitt baskets on their backes, goeing always stooping, by reason of the lowness of the pitt: each bearer carrieth this basket six fathome, where upon a bench he layeth it; where meeteth him another boye with an emptie basket, which he giveth him, and taketh that which is full of coles, and carrieth it as farre, where another meeteth him, and so till they come under the doore, where it is lifted up. In one pitt there will be sixteen persons, whereof there will be three pickaxes digging, seaven bearers, one filler, four winders, two ridders who rydle the coles when it is alande, first to draw the small cole from the bigg by one kinde of rydell, then a second rydling with a smaller rydle with which they draw smaller coles for the smythes from the colme, which, indeed, is but very dust, which serveth for lyme burning. These persons will lande about 80 or 100 barrells of cole in a day. There tooles about this worke are pickaxes with a round pole, wedges and sledges to batter the rockes that crosse their worke.

“All tymes of the yeare is indifferent for workinge, but the hott weather worst, by reason of sodaine dampes that happen, which often cause the workmen to swoone, and will not suffer the candles to burne, but the flame waxing blew of collor, will of themselves go out. They work from six to six, and reste an hour at noone, and eate their allowance as they terme it, which is 6*d.* in bred, and 4*d.* in drinke amonge a dozen; this is of custome on the charge of the pitt, although they worke on their owne charge.”

“The cole they finde is eyther an *ore cole*, a *string*, or a *slatche*. The *ore* is the best, and is a greate veyne spreading every way, and endureth longest: the *string* is a small narrow veyne, sometymes two, three,

FUEL.

e, or foure foote in bignes, and runneth downe
t, and is always found betweene two rockes: a
che they call a piece of cole by itselfe, found in
earthe, and is quicklie digged about, and no more
e founde of that peece.

The workemen of this black labor, observe all
lished holy dayes, and cannot be wayned from that
e.

About three yeares past, there was a generall and
imposition or custome raysed upon the coles,
owout the realme, which was, that for every chaul-
n transported, her majestie shall have of custome at
rate of 4*d.* for every barrell, whereas the price of
barrell is but 6*d.* soe that the custome is neare the
ce of the cole: and the like custome was demanded
the colme, which was sould but for one penny the
rell; for which the Irishmen who are servid from
country, and the seamen greatly complayned,
dging their trade impayred, and that it would turn

most of the iron-works have been established, and deep vallies have been formed by the Tawy, Neath, Avan, Cynon, Rhondda, Taff, Romney, Sirhowy, Ebwy, Clydach, Avon, &c. coal seams are entered into, all at once, through levels in the sides of the mountains. One of these levels, near the Margam copper works in Glamorganshire, is from a mile and a quarter, to a mile and a half in length. The hill between Aber Dâr and Merthyr Tudful is perforated with levels; on the N. E. side by the Cyfarthfa Company, and on the S. W. side by the Aber Dâr Company: there is no underground communication as yet between the two companies; but there will be, through a level nearly three miles in length.

About the conclusion of the 16th century, Mr. Ed. Lhuyd, in his pursuit of natural curiosities to enrich his *Lithophylacium*, describes this method of raising coal, as then practised on the Clydach in Brecknockshire: "At a place called Llan Elhi, we searched some coal and iron mines: their coal works were not pits sunk like draw-wells, but *large inroads* made into the sides of the hills, so that three or four horsemen might ride abreast: the top is supported by pillars left at a certain distance, and they make their bye lanes as in other pits, as the vein requires."—*Phil. Trans.* XXVII. No. 334, p. 467.

"Notwithstanding the principal strata of coal in Glamorganshire lie from five fathoms to 600 or 700 fathoms deep, still it has not been necessary to pursue these strata deeper than about 80 fathoms.

"The veins of coal and iron ore, in the vicinity of most of the iron-works in Monmouthshire and Glamorganshire, are drained and worked by levels or horizontal drifts, which opportunity is given by the deep vallies
lies

s which generally run in a north and south direction, intersecting the range of coal and iron ore, which run in an east and west direction under the high mountains, and thereby serving as main drains; so that the collier and miner here get at the treasures of the earth, without going to the labour and expense of sinking deep pits, and erecting powerful fire engines. However, in process of time, in situations where the coal and iron ore that are above the level of those natural drains become exhausted, it will be found necessary to sink shallow pits and erect fire engines for the draining and working of the coal and iron ore; and at a future period pits of still greater depth must be sunk for the same purposes."—*Mr. Martin, Phil. Trans.* 1806, vol. XVII. p. 324.

9. *Quantity of Coal, Consumption, &c.*—"The deepest part of the bason is between Neath in Glamorganshire and Llanelly in Caermarthenshire: the uppermost stratum here does not extend a mile in a north and south direction, and not many miles in an east

this county, by reason of the bason not being of sufficient depth and width to hold them.

“ There are 12 veins, or strata of coal, in this mineral depository, from three to nine feet thick each, which together make $70\frac{1}{2}$ feet; and there are 11 veins more, from 18 inches to three feet, which make $24\frac{1}{2}$ feet, making in all 95 feet; besides a number of smaller veins, from 12 to 18 inches, and from 6 to 12 inches in thickness, not calculated upon. By taking the average length and breadth of the foregoing different strata of coal, the amount is about 1000 square miles, containing about 95 feet of coal, in 23 distinct strata; which will produce, in the common way of working, 100,000 tons per acre, or 64 millions of tons in every square mile.

“ As every stratum rises regularly from its base to the surface, and is frequently visible and bare, in precipices and deep dingles; and often discovered, where the surface soil is shallow, in trenching, or in forming high roads; and by reason of the whole country within this boundary being so perforated by pits, and so intersected by the various operations of art and nature; it is not probable that any vein of coal, iron ore, or other stratum, remains undiscovered in this mineral bason.”—*Mr. Martin.*

We had made a rude calculation of the quantity of coal in South Wales, in company with some intelligent persons at Merthyr Tudful, before we received a transcript of Mr. Martin's Communication to the Royal Society. Our data, we now find, were upon a low scale; making allowance for the dip of the strata, or that two sides are of greater extent than one side of any triangle, we had reduced the 1000 square miles to 900, abating the superficies, owing to the breaking in
of

of the Bays of Caermarthen and Swansea, the great number of extensive faults, the bouleversement of strata in different parts, &c. Instead of 95 feet depth of coal, we calculated upon 81 feet, making allowance for the lesser extent of the upper strata in the grand trunk, and for the inferiority of depth in Pembroke-shire. Upon these data, deducting one-fourth part out of the gross amount for waste, and coal left behind, an acre will produce 98,010 cubic yards; which at the rate of 19 cwt. to the yard, will give 93,109 tons of coal per acre: this multiplied by 640, the acres in a mile, and again by 900 miles, the extent of the tract, will give 53 thousand 568 millions of tons of coal.

According to Mr. Martin's calculation, the bason contains, or rather, did once contain, 64 thousand millions of tons.

Mr. Williams, in his Mineral Kingdom, was the first who sounded the alarm, that Britain, at some remote period, might be without any native coal fuel. He was then treated as a chimerical writer; but calculators have since coincided with his opinion.

In the Report of Northumberland, Messrs. Bailey and Culley, calculate the duration of the Newcastle coal tract of 128,000 acres, which, at the known annual consumption of 155 acres, would be exhausted in 825 years, supposing the tract to bear the average depth of six yards of coal; but taking the more probable average depth at four yards, then all the Newcastle coal would be consumed in 450 years; and three yards depth, would last no more than 400 years, supposing the annual consumption and exports to remain stationary.

The South Wales coal tract, it is true, has not the City of London to supply with fuel; but it has to supply

supply the home consumption of a great portion of seven counties;—about 58 blast furnaces;—about 50 iron forges and rolling mills:—about 10 large tin and copper works, whereof one copper work is said to consume about 70 tons of coal per day when in full work; besides vast exports from Newport, Cardiff, Neath, Swansea, Burry River, Sander's Foot, Milford Haven*, St. Bride's Bay, &c. for supplying steam-engines, lime-kilns, malt-houses, hop-kilns, and house fuel, in the West of England, the western coasts of Wales, Ireland, &c.

It will be allowed that the calculation of the duration of the coal in South Wales, is a difficult task; and more productive of trouble than of either utility or satisfaction: we shall therefore leave it to those who have better means, and more leisure: it will be allowed also, that every ounce of coal we burn, so far reduces the general or public fund;—then, if things remain in their present state to a certain period, it is clear that the inhabitants of the coal tract, where coal is now purchased at 4s. or 6s. a ton, will be reduced to the necessity of driving their cars into the mountain turbaries for fuel; unless the dreams of chemistry be realized, and gases be discovered, permanently productive of heat as well as of light.

10. *Price of Coal.*—Owing to the very unequal distribution of this chief of fuels, the price must considerably vary in different places. In parts of Radnorshire

* Mr. Hassall, states the export of stone coal and culm, from Milford, during the year 1792, at 60,523 chaldrons; amounting to 37,426l.; “besides the vast quantities consumed in the country, in fuel for the inhabitants, and for burning lime, drying malt, and smith's work.”—*Original Report of Pembroke*, pp. 60, 61.

FUEL.

al is 15 times, and in parts of Cardiganshire 20 times dearer than at the pits; where it is bought, in best places, at from 4s. to 6s. per ton, long weight. In the interior, where good roads have not yet made their appearance, horse-loads of 2 cwt. each, are sold 3d. or 3½d.

In the reign of Elizabeth, before the tax upon coal carried coastwise took place, stone coal in Pembroke was sold for 6d., and culm for burning lime at one penny per barrel of 40 gallons. Culm, now brought from sea to Aberporth, in Cardiganshire, costs 2s. 9d. per barrel. In the Dovey, on the borders of North Wales, culm from Milford, sells for 16s. and culm from Neath, for 18s. a ton measure, weighing about 2 cwt.

At Aberystwyth, binding coal from Newport sells for 38s. a ton measure; and from Liverpool, &c. 40s. including the duty. Liverpool coal is inferior to the Newport, and is never imported but as ballast.

First Bed of the Grand Section of South Wales: it consists of varieties of argillaceous rocks; roofing-slates; flags, or flooring stones, &c.; and, in the western parts, excellent building stones, whereof the houses in Machynlleth and Aberystwyth afford good specimens. In the more eastern parts, this bed degenerates by degrees into very perishable shale, scarcely fit for the covering of roads: this, however, is here and there intersected with veins of grey mountain rock, whereof good samples may be seen in well-built houses at Llanidloes, brought from a vein running as usual from N. E. to S. W. across the road leading from that town to Llangurig. Beginning at the foot of Cader Idris, this argillaceous bed crosses the Dovey into Cardiganshire, engrosses the whole county, crosses the Teivy into Caermarthenshire, and proceeds to the south of the river Towy: from the more eastern point of Aran Vowddwy, this bed crosses the Dovey into Montgomeryshire, takes in the whole of the county, crosses the Kerry Hills into Radnorshire, occupies the whole of the county (excepting a little at the south-eastern corner) crosses the Wye into Brecknockshire, where it serves as the base of the Eppynt hills, the summits of which consist of the

Second Bed, of red sandstone, with its parallel accompaniments, hard building-stone, and micaceous flags and tiles. This bed, proceeding southward, crosses the river Usk, and occupies the loftiest range of mountains in South Wales, the Beacons, or Vans of Brecknockshire and Caermarthenshire. These rocks exhibit a very regular stratification, bearing the same steady point of inclination, and without any foreign admixtures, excepting in cases of transition. Upon this vast mass lies the

3d Bed, of *Puddingstone*, in which are cemented

FUEL.

ge quartz pebbles of various colours, reddish, green-
, &c.

4. *Primitive Limestone*—(the middle range, described in the Section on Soil and Surface); some parts stratified, others amorphous; without any marks, are occasionally a coaly appearance like flakes of wood bark, igniting with nitre. Henceforward, the succeeding strata appear to advantage, with very regular inclination towards the south-east, in Taf-Vechan glen, near Merthyr Tudful; on the bed of the Clych in Brecknockshire; and in other places where the deepest dingles occur.

5. *Chert*, fine grained; about four feet thick.

6. *Limestone*, whiter, or paler coloured than that of No. 4; having occasionally a few marine exuviae; about 45 feet thick.

7. *Chert*, similar to that of No. 5; about four feet thick.

8. *Chert*, coarse grained, inclining to burr; about four feet thick.

it may therefore be considered as the base of the northern series of coal veins in this tract: its thickness is 45 feet. This rock is also called *Carreg Wyllt*; Nicholas's rock; *Roken Gymraeg*.

No.	Ft.	In.	No.	Ft.	In.
12. A vein of coal,	1	8	45. Blue vein mine,	0	4
13. Blue cleft, or clunch, ...	15	0	46. Blue cleft,	2	0
14. A vein of coal,	1	6	47. Blue pin mine,	0	3
15. Blue cleft,	10	0	48. Blue cleft,	2	0
16. A vein of coal,	2	6	49. Lower blue vein mine, ...	0	3½
17. Blue cleft,	24	0	50. Ground hard cleft,	2	6
18. A pin of mine,	0	2½	51. Blue pin mine,	0	2
19. Cleft,	2	0	52. Blue cleft,	1	6
20. A pin of mine,	0	3	53. Blue vein mine,	0	3½
21. Cleft,	2	0	54. Blue cleft, with two } mine-pins,	5	6
22. Rosser vein mine,	0	4	55. Yellow vein mine,	0	4½
23. Blue cleft,	8	0	56. Blue cleft,	1	7
24. Fire clay,	1	4	57. Rock pin mine, {	0	3
25. A vein of coal,	1	6	58. Hard rock,	3	7
26. Blue cleft,	2	7	59. Ground blue cleft,	2	6
27. Pin garw mine,	0	2½	60. Black pin mine,	0	5
28. Blue cleft,	4	0	61. Blue cleft,	4	0
29. Knobby vein mine,	0	3	62. Spotted pin,	0	2½
30. Blue cleft,	4	0	63. Ground blue cleft,	2	0
31. Large vein of mine, ...	0	5½	64. Yellow pin mine,	0	3
32. Blue cleft, with three } pins of mine,	8	0	65. Blue cleft,	15	0
33. Jenkin vein mine,	0	3½	66. Gelli deg coal,	3	4
34. Blue cleft,	10	0	67. Hard rock, or quar } cymraeg,	45	0
35. Yellow pin, not worked, ...	0	3½	68. A vein of coal,	1	6
36. Hard rock and cleft, ...	10	0	69. Blue cleft,	5	0
37. Black pin mine,	0	3	70. A vein of coal,	2	0
38. Ground blue cleft,	3	0	71. Blue cleft,	6	0
39. Little blue vein mine, ...	0	4	72. Cwm y Mwyn coal, ...	5	6
40. Blue cleft,	6	0	73. Cleft,	8	0
41. Large blue vein mine, ...	0	6	74. Fire clay,	4	0
42. Blue ground, with } beds of rock,	3	6	75. Black sulphureous schist, ...	1	6
43. Balls of mine,	0	7	76. Blue cleft,	5	0
44. Blue cleft,	4	0	77. Large balls of mine, 3cwt. ...	1	2

FUEL.

	<i>Ft. In.</i>	<i>No.</i>	<i>Ft. In.</i>
clay,	2 0	98. <i>Cwm Cannaid</i> , lower } vein of coal,	4 0
in of coal,	1 4	99. Balls of mine,	0 3
cleft,	1 3	100. Blue cleft,	12 0
in of coal,	1 6	101. Vein of coal,	2 6
and hard cleft, ...	15 0	102. Blue cleft, with beds } of rock,	12 0
.....	1 0	103. <i>Cwm Cannaid</i> upper } vein of coal,	4 0
and Abram's mine, ...	0 3	104. Blue cleft, with pine } of mine not worked, }	45 0
d cleft,	12 0	105. Balls of mine,	0 2
in of coal,	1 9	106. Blue cleft,	3 6
d cleft, with beds }	15 0	107. James Nicholas's mine,	0 4
rock,	15 0	108. Blue cleft, with beds } of rock,	45 0
m y glo coal,	9 0	109. A vein of coal,	1 4
d cleft, with beds }	90 0	110. Blue cleft,	18 0
rock,	90 0	111. A vein of coal,	2 0
all vein of coal,	1 0	112. Blue cleft,	27 0
rd cleft,	9 0	113. Little vein coal,	1 6
rd Rhyd y car coal,	5 6		
he cleft,	2 0		
ls of mine,	0 3		
he cleft,	34 0		
yn dyrus coal,	2 9		

only 8 inches pinching. In another part of the Section we find “*Yr âs lûs* bottom coal, 3 feet—Pinching, 4 inches.—*Yr âs lûs* engine coal, 1 foot.—*Yr âs lûs* top coal, 4 feet 9 inches :”—in all 8 feet 9 inches of coal, with only 4 inches of foreign admixture. In this section also, very minute veins of coal occur, about twenty under 18 inches thickness.

<i>Substances.</i>	<i>Cyfarthfa.</i>		<i>Dowlas.</i>	
	No. of Beds.	Depth.	No. of Beds.	Depth.
		<i>Ft. In.</i>		<i>Ft. In.</i>
Rock, clunch, bind, &c. -	48	614 6	108	526 7
Iron mines, - - - -	28	9 3	58	11 9
Fire clay, - - - -	3	7 4	3	8 6
Coal, - - - -	22	58 8	36	56 8
Totals	101	689 9	205	603 6

In order to make the Grand Section complete, we ought to have been in possession of the strata which succeed No. 113, in the Cyfarthfa Section, from thence southward to the “Saddle,” or heart of the mineral tree, where the southward inclination ends, and the counter-series take place; both series meeting, or supposed to meet, in an angle somewhat similar to a broad Roman V, or in a curve like a broad Roman U: but this link must be left for others to join.

The stratification of the southern series has not as yet been so clearly ascertained as that of the northern; and for obvious reasons: on the northern series are established, almost exclusively, the great iron-works, where the skill and spirit of the proprietors have neglected no means of ascertaining the structure of their mineral tract. The southern series, on the contrary, excepting in a few places from Margam, and Neath, to

FUEL.

annelly in Caermarthenshire, have never been opened upon petty scales for home consumption. Its natural position also, renders it far less favourable to investigation; for Mr. Martin's "Bason" does not stand level; its northern brim being much higher than the southern; so that, (excuse another new term) it is like a *mineral boat*, upsetting towards the Bristol Channel. The lowest seams of coal in the northern series crop out at the tops, or on the northern sides, of the highest hills in the tract; whilst the lowest of the southern series are, in Glamorgan Lower, under the level of the Bristol Channel.

The siliceous and calcareous rocks, which serve as the bases of the northern series, also crop out in stupendous masses; and are continuous in their line of trending, from the "Farewell Rock" of Monmouthshire to the "Doon Rock" of Pembrokeshire; and the lowest bed of coal is there every where known to a

“ In digging for coal on the marsh, last winter, about three fathoms deep, they came to another surface of ground of about three feet and a half thick, of a kind of turf earth, for being dry it would burn as well as turf; in which the stock of an oak tree, root and all, was found as it grew, and the bark remained so that it might be judged to be an oak; but so soft, except a little nearer the heart, that it might be cut with a shovel. Below the oak and turf soil they had clay like the first (none such to be found but where the tide comes) for three fathoms more, until they came to a third surface (formerly) more loamy and thinner than the middlemost, with gravel and roble stones mix'd beneath; next the clives, *and then coal: *** &c. &c.*”

Strata of puddingstone, millstone burrs, freestone, and micaceous schist called *pennant*, occur on the line of demarcation between the southern series of coal and the white limestone of the Vale of Glamorgan. This limestone is of secondary formation of an undulating stratification, differing from the middle range of primitive limestone, in not dipping under the coal strata, but to the reverse point under the Bristol Channel.

The fullest account of beds of coal in this southern series, we received from Mr. Rees, who, in September 1811, worked the Trecastle colliery, near Llanhary, in Glamorganshire. This section contains 12 beds of coal, the nearest in succession to each other; leaving the lower and upper strata for future enquiries.

1. Cribwr

FUEL.

	Brought forward,	<i>Ft.</i> 9	<i>Ins.</i> 6
Grey "ward rock," as No. 19.			
Black shale, interlined with veins of ore.			
<i>Fifth coal</i> , "big vein,"	-	8	6
Blue cleft, with vegetable impressions,			
Brown shale, with pins of ore.			
Grey ward, more frangible than Nos. 19 and 22.	- - - -		
Black shale.			
<i>Sixth coal</i> ,	- - - -	3	0
Black shale, interlined with veins of iron- stone and mine balls : the shale gets gradu- ally browner in colour, and both coal and measures curve upwards in approaching a grand fault, which separates them from those over the Hir Vynydd, in the Valley of Neath.			

21 0

from $2\frac{1}{2}$ feet to 7 feet ; and many other veins exhibit the same irregularity.

Neither of the three species of coal is much debased by sulphur ; there is however a gradation in the scale of debasement, according to the species : more sulphur appears in the binding than in the coaking coal, and more in the coaking than in the stone coal : the more western in the bason the less sulphur.

The beds of ironstone and clunch that lie most contiguous to coal, are mostly marked with vegetable impressions.

Clunch contains vitriol of iron ; and in some mines the water is so vitriolated, that it excoriates the hands and faces of the workmen.

CHAP. XV.

POLITICAL ECONOMY;

CONNECTED WITH, OR AFFECTING AGRICULTURE.

SECT. I.—ROADS.

THE first Act of Parliament for the repairing of roads, about the middle of the sixteenth century, did not affect Wales: for two centuries after that period, the state of the roads was such, even in England, that, according to tradition, a journey from Wales to London was such a hazardous enterprize, that few had the hardiness to undertake it without first settling their

few enlightened individuals who had a right view of things, had something to do against the opposition of a numerous party, who superficially calculated upon the loss of arable and pasture land to be sacrificed in the widening of the roads, and the tolls to be paid at the turnpike gates.

There is a Monmouthshire anecdote, that when turnpike roads were first to be introduced into that county, the innovation, as usual, met with a strenuous opposition; and Mr. Valentine Morris, the celebrated, and unfortunately the imprudent improver of Persfield, being amongst the most active supporters of the measure, was examined as to its general utility at the bar of the House of Commons, and questioned—"What roads have you in Monmouthshire?"—he answered—"None."—"How do you travel then?"—"In ditches"—he replied.

Many of the first improvements in South Wales originated in the exertions of the early Agricultural Society established in Brecknockshire. This Society in September 1755, encouraged the improvement of roads by publishing, that if any parish raised a sum, over and above the statute duty (not exceeding 20*l.*) towards repairing the post-road leading from Caermarthenshire to the county of Hereford, through that of Brecknock, the inhabitants of such parish should receive half such sum from the Society: such work to be properly performed before November 1756. Four parishes, viz. St. David's, near Brecon, Llan Ddew, Llan Spyddyd, and the Hay, claimed their respective bounties. In 1757, the Society extended the same bounties to such parishes as had roads leading through them to lime-kilns and coal-pits: a surveyor-general for the county was appointed, with a fixed salary; and

ROADS.

a regular stage coach was established to run from
con to London, in the same year.

In the year 1763, the land owners in Caermarthen-
re took in hand the prosecution of the new road, at
boundary of their county, in the parish of Myddfai;
to this end, they wisely procured, in the first in-
stance, an Act of Parliament, granting the necessary
powers to widen and improve the main road, from
border of Brecknockshire, down the Vale of Towy,
through the towns of Llandovery, Llandeilo, and
Caermarthen, to St. Clare's, and from thence to Ta-
n Spite, on the borders of Pembrokeshire. Here, a
similar improvement was undertaken by the land
owners of the latter county; but they copied the ex-
ample of Brecknock rather than Caermarthen, and
acted to the effect of voluntary subscriptions; which
both counties proved equally ineffectual. About
year 1767, an Act of Parliament was obtained for
a county respectively. The Brecknockshire Act
led the Trustees to borrow 10,000*l.* on the credit

In the year 1770, the county of Cardigan followed, and obtained an Act for widening and repairing several of the main roads between the principal places.

In Glamorganshire, the main road from Cardiff, through Cowbridge, Bridge End, and Neath, to Swansea, was completed at an early period. In 1771 and 1779, other Acts extended the benefit to other roads, communicating in different directions with the main road of the Vale.

Mails began to be conveyed by stage coaches, in August 1785; and in 1787, the first mail passed through the counties of Brecon, Caermarthen, and Pembroke, to Milford-Haven, and thence across the Channel to Waterford.

"The gentlemen above the mountains" (says Mr. Hassall, in Pembrokeshire, p. 30) "declined including their roads in any of the Acts obtained for the lower division of the county; alleging they could keep them in repair by statute duty: a sanguine idea which experience proved to be futile." However, in 1791, or 1792, an Act was obtained to connect, by improved roads, the towns of Haverfordwest, St. David's, Fishguard, Newport, and Cardigan.

An Act was obtained for Radnorshire, about the same time as for the other counties. In describing the state and management of these roads, in 1794, Mr. Clark seems to have dipped his quill in gall deeper than usual. Many of his assertions, however, were not contradicted in the county; though many of his grounds of complaint were soon after removed.

That in the formation of new roads, when parliamentary authority was obtained for the purpose, the old line of direction, up and down hill, has been too closely adhered to;—that private property has in too

ROADS.

ny instances been spared, when a round-about way
er waste uplands presented itself;—that roads were
first made too narrow, to be easily kept in repair,
to expedite the passage of travellers;—that farmers
lect to perform their statute duty as long as they
permitted so to do;—is a string of general com-
ints and accusations, and is scarcely more appli-
ple to one county than another; as human nature is
most every where the same.

Radnorshire, moreover, admits of a stronger apo-
y than many other counties, for the badness of
roads; which run, in many places, over flat clayey
faces; and the materials to be laid on them are
stly of a very perishable shale: the trustees also are
t so evenly distributed, as in most other counties.
gentleman, resident in the county, gives the follow-
account of the Radnorshire roads in 1812.

“ The inhabitants of this county cannot boast much
their roads; as even their turnpikes are frequently

injury than good ; for as the Surveyors are to deliver in their accounts at Michaelmas, they are sometimes resolved at least to make a show of having done something ; and accordingly plough up the soil just at the edge of winter : bad weather, soon after, prevents their proceeding with the work, were they ever so desirous ; and the traveller is obliged to wade through the mire as well as he can. “ Were the Surveyors called to account in the month of June, they would then be induced to do something in the spring ; and the succeeding summer would contribute to settle and harden the work against winter.”

These *road ploughs* have been already noticed in Chap. V. among Implements : they are not, we believe, of Welsh origin ; for they are equally common, and scarcely to better purpose, in many places, to the east of Offa's dyke, in England.

The first series of improved roads, opening a communication between England and the western coasts of Wales, ran in a parallel direction nearly east and west : 1. Through the Vale of Glamorgan : 2. From the counties of Monmouth and Hereford, through those of Brecon, Caermarthen, and Pembroke : 3. Along the Valley of Teivy to Cardigan : 4. From Herefordshire, through Radnorshire and Cardiganshire to Aberystwyth. Under the powers of succeeding Acts of Parliament, transverse roads were formed, in a direction more or less north and south, over mountains, or along dingles intersecting them ; so as to form connecting links between the roads of the first series.

The earlier the date of our turnpike roads, the worse they were planned. “ There was a misfortune,” says Mr. Clark, “ attending the original making of the turnpike roads throughout the whole kingdom ; and

-ROADS.

county has felt, and still continues to feel, its
re of the universal calamity. Wheel carriages
e not then so common as they are at present : hence
superior advantage of level roads were but faintly
n. The gentlemen, therefore, unfortunately, did
go to the root of the evil ; for, except where the
s were very steep, they contented themselves with
lening the old road. This was the case of almost all
kingdom. When the land was originally enclosed,
top of the hills being less fertile than the bottom,
road was generally pushed there by the land own-
; and their descendants at this day feel, and are
g likely to feel, the sad effects of this puny pars-
ny. The present trustees, however, are very sen-
le of the improper direction of the turnpike roads
general, through this county ; and by a patriotic
rtion worthy of imitation, are now busy in making
w roads round the bottoms of those hills which their
s considering predecessors had boldly climbed

an abrupt hillock, like a stage in Bartholomew fair, for no other purpose than to descend it immediately on the other side. In some cases, this inconvenience is now remedied, by turning the road a furlong, more or less, to the right or left, and following the base of the hillock. In cases where the hillock is a continuous ridge, it can be remedied only by cutting, and lowering the summit: and, not uncommonly, those abrupt hillocks consist of gravel; and the flats on both sides, of clay, peat, or other soft soil; then, in cutting the ridge of gravel, one half of the breadth of the road this year, and the other half the next, two objects are gained, the levelling of the road, and the procuring of materials for the adjoining sloughs.

The public at large are much indebted to the proprietors of the iron-works, for a considerable number of improved roads through the coal and iron tract, in the counties of Monmouth, Glamorgan, and Brecon: among others, a shorter cut from Abergavenny, and the northern part of Monmouthshire, to Swansea, has been opened with a good carriage-road, through an interesting tract of country, abounding with minerals and manufactures, where scarcely any kind of roads existed before. This new road, from Abergavenny to Merthyr Tudful, is 20 miles; from Merthyr, through the picturesque Valley of Neath, to Swansea, is 31 miles; in all 51. The old road through Brecon, and then over a rugged hilly road to Pont Nedd Vaughan, was 57 miles: the circuitous road through Newport and Cardiff, is scarcely less than 78 miles: so that by this new road, there is a saving of six miles, and avoiding a bad road through Brecon; and a reduction of 27 miles of the circuitous road through Cardiff.

ROADS.

A similar road has lately been opened, up the valley of Aber Dâr, parallel with the river Cynon, to connect the Cardiff road in the valley of Taff with the road of Neath valley.

These new roads are the more grateful to strangers, as they intersect a most romantic tract, interesting to the inquisitive mind, and to the admirers of nature in its wildest forms.

To these might be added scores of miles of iron railways, made in different parts of the four counties, in which lies the grand trunk of the mineral tree. Many of these iron roads, formed upon the best principle, with the least declivity possible, connect the thoroughfare roads; and are open to travellers on paying moderate tolls at the gates. Some further account of railways will be given in the sequel of this Section.

Keeping pace with other rural improvements, which have made greater progress within the last few years than in half a century before, an unusual activity has

access to lime, coal, and the Swansea canal, by means of a new road from the confine of Brecknockshire to the Llandovery road; and from Pont ar Llecbau, parallel with the Sawdde Brook, to the several lime-kilns on the Black Mountain; and from thence to the collieries on the west of the Tawy, to the canal, and by that to Swansea, and the Bristol Channel. This is one of the most profitable roads, in an agricultural view, that ever was proposed.

The year 1812 was very prolific in the most approved plans of new roads to be presented to Parliament, at the expiration of the Turnpike Act term of 21 years, in 1813. Caermarthenshire has been uncommonly active in this respect. In addition to the foregoing, a new road is to be made from Caermarthen to the confine of Glamorganshire, on the river Loughor, opposite Tal y Bont; by which every hill will be avoided, and four miles saved, between that town and Swansea. Another line, from the Great Mountain to Llan Deilo on the Towy, will reduce the distance between that town and Swansea, from 28 (the distance through Llan Non) to about 21 miles.

A new road from Caermarthen to Fishguard, proposes a saving of ten miles, in travelling to Ireland, besides several leagues of sailing across the channel.

Mr. Fenton, on this subject, says, "as the Irish packets often put in at Fishguard, sometimes twice a week, not being able to make Milford, a question may fairly be started—whether it would not be to the advantage of Government, to open a nearer communication with the water side, than that which exists with Milford, by forming a road 15 miles shorter, from Caermarthen across the hills to this port (Fishguard);

B b 4

where

where a packet might be stationed, and the intercourse with the sister kingdom expedited?"—*Cambrian Register*, Vol. I. p. 263.

The New Quay, in Cardiganshire, is also a candidate for being the station of the Irish packets. Mr. Turnor, in the Original Report, p. 34, writes, "The present most immediate communications with Ireland, are confined to the two extremities of this part of the kingdom. The nearest road to Holy-Head from the capital, is 274½ miles; the other to Milford is 246 miles; and to a more central place, in this county, called New Quay, only 213 miles. This inlet of the sea is supposed to be a situation well adapted for a direct communication with Wicklow and Dublin. Ships of considerable burthen might come in hither; and with the assistance of a pier, might ride safe in all weathers. The pier might be made at an easy expense: the materials are all on the spot. Besides the advantage of a public road, something more might be expected from such a communication: a growing population, and increasing commerce, would of course be the consequence. At present we have no place of safety for ships any where on the coast: Cardigan, Aberystwyth, and Aber Aeron, are equally dangerous. By the means of a pier at New Quay, many useful lives might be saved; and perhaps the expense of it to Government would be more than compensated by a consequent addition to its revenue."—*Mr. Turnor*, 1794.

"30,000*l.* would make a pier to secure 200 shipping at *Carreg Ina*, about a mile from New Quay: ships could come in at quarter flood: the situation is just half way between Liverpool and Bristol. All the Irish and English ports, it is presumed, would subscribe

scribe towards this pier ; as it would eventually turn to their advantage in saving lives, shipping and cargoes."—*Capt. Longcroft.*

Were this shorter cut from the capital to St. George's Channel ever to take place, the present mail-road would be relinquished at Llandovery, and thence through Llan Bedr (Lampeter) to New Quay.

To return from this digression to the Caermarthen-shire roads : "*Caer vawr Vyrddin*" has from remote times been considered as the capital of South Wales ; and by the number of new and improved roads converging to it as a point from all parts, it may still maintain its claim to that respectable appellation. A new road is to strike off on the left from the mail road at Landowror to Tenby, which will shorten the distance 15 miles between Caermarthen and that fashionable watering-place ; and a new assize road is either in making, or on the tapis, from Caermarthen to Cardigan.

In the Silurian circuit, the assize road from Cardiff to Brecon, and from thence to the Wye, is above law ; but from the Wye to Presteign, it is frequently the subject of complaint, and sometimes of indictment.

In the Dimetian circuit, the assize road from Caermarthen to Haverfordwest, as it follows the mail road, is in travelling repair ; and so on from the latter place to Fishguard ; but thenceforward to Newport and Cardigan, too few hammers are employed by the Surveyors.

Expenses.—A heavy burden upon the public, is the expense of procuring Acts of Parliament empowering the formation of new roads. Mr. Fox (Glam. p. 51) says, that " applications to Parliament, for powers to

ROADS.

improve roads in Glamorganshire, had, within a few years previous, to the date of his report (1794) been attended with an expense of 1200*l*. We were informed in the Vale of Towy, that a bill for procuring one turnpike act within the county of Caermarthen, amounted to 600*l*.

Some are of opinion that a general road bill ought to be presented; but the fate of the late general enclosure bill presents a formidable *veto* to such a proceeding. When the enclosures of wastes, and the formation of new roads, by authority of Parliament, shall have attained nearly their utmost extent, probably both the general bills may pass; and even then, considerable good might be expected from their operations: as the fag-ends of the island would be under inducement, owing to the reduction of the expenses, to enclose such wastes, and to form such new roads, as would never be enclosed nor formed under the present system.

the interruption of a gate, badly hung, presents itself at almost every furlong.

2. The *coal tract* exhibits roads of a very different description in general from those of Number 1. Here evaporation is more to be depended upon for the disposal of rain-water, than absorption. The materials are perishable, excepting in places where the siliceous measures crop out, so as to afford quarries. And moreover, few roads are in a more neglected state, excepting within the influence of mansion houses, the great iron-works, and such collieries as are worked with spirit. It is not probable that the interior, and the southern series, of the tract, will be intersected with either canals or rail-roads, until the coal and iron of the northern series, whereon the great works are now established, shall be considerably exhausted.

3. The *middle limestone* range is so narrow, that its roads scarcely merit particular description. The materials are excellent, like those of No. 1; but being of the primitive kind, and less frangible, are seldom broken sufficiently small.

4. In the *red sandstone tract*, the materials are either perishable or durable, according to the quality of the cement in which the particles of sand are imbedded. The greyish building-stone is durable; next to that the micaceous; the more red and sandy are sooner reduced by wheel-carriages, and make the road heavy, unless frequently scraped, and replenished with fresh materials. Next to the limestone, this tract forms the best base for roads, in general, having much greater powers of absorption than the retentive substrata of the coal and shale or slate tracts.

5. The *shale or slate tract* has some good, and a great

ROADS.

at many bad roads. The most common material is friable shale, crumbling in the weather, and soon reduced to mud, where rain-water lodges, and wheel-riages are numerous.

The transverse or oblique veins of grey mountain rock, which run through this tract, afford durable materials for roads, where they are to be found; but they not occupy a thousandth part of the tract.

Pembrokeshire is better stored with road materials than any other county in South Wales; its limestone tract considerable; its coal tract narrow; and a great portion of its shale tract abounding with siliceous rocks, affording materials equal to the imported London paving-stones, in durability. In many places in this county, the stones are too durable; were they more perishable the roads would be more level.

As Pembroke is the best, so Radnor is the worst, supplied with road materials. Where good materials are most wanted, they are generally the least in supply.

tially serve the country, by repairing the roads more generally with *field stones*; and the expense of gathering them, if done by women and children at so much a load, would frequently be less than digging a bad sort of material called *rabb* (shale) in the neighbouring quarries. A load of field stone is better than two of *rabb* for service."—*Mr. Hassall, on the Carm. Shale*, p. 43.

Field stones are becoming more generally used on roads, wherever they are convenient: they are preferable not only to the *rabb*, or shale, of the quarries, but also to the river stones and gravel of the shale tract. Field stones, in the shale tract, consist frequently of substances foreign to the tract; and, as they are commonly of a rounded or abraded form, they must have been brought from a distance; and by what power or means less objectionable than a deluge? Among these transplanted field stones we may observe quartz, whinstone, puddingstone, grit, variolite, porphyry, trap, &c.; and vitriolated barytes sometimes occur in a rounded form. River gravel commonly consists of the substances of rocks and alluvial hillocks, whose bases are washed by the stream in its course: hence in the shale tract, river gravel is scarcely more durable on roads than the shale of the quarry.

Modes of preserving Roads in repair.—"There is a method adopted of late by the trustees, which does great credit to them. The road, when once put into proper repair, is farmed out by the year, or for a term of years, at so much per mile, to keep and leave in repair at the end of the term. The price is from two to five guineas per mile, according to the distance from materials.

ROADS.

materials. They endeavour to get every farmer to repair that part of the road that goes through his own land;—a wise and advantageous measure this for *both parties*—since the farmer can repair the road along his own land for one half the price that he could do were he only one or two miles off. If the team is going from one place to another, it takes a load of gravel to lay on some part of the road; if it returns empty, it does the same. When the clover is to be cleared of the stones, they are sent for the road, and will pay for doing it. If there is a hole or two in the road, it may be mended in an evening, or a morning, in less time than a man who is two miles off would lose in coming to look at it. There is no method of keeping the highways in repair so prudent for the trustees to adopt, in any district, as that of letting every farmer have the road through or along the side of his own land, at an annual rent.”—*Mr. Burke, in Brecknock*, p. 53.

This theory is very plausible; and it casts a reflec-

tween themselves the care of the roads, superintending occasionally the surveyors' management within their respective allotments, and directing them with their advice. This is the most practical plan that we are acquainted with, of preserving roads in repair.

Rail-Roads.—In the year 1791, there was not, as we are told, one yard of iron rail-road in South Wales: in September 1811, the completed rail-roads, connected with canals, collieries, iron and copper-works, in the counties of Monmouth, Glamorgan, and Caermarthen, amounted to nearly 150 miles.

For the forming of *one* rail-road for the benefit of the *two* counties of Brecon and Hereford, *two* plans and *two* estimates were made by *two* different engineers, and *two* Acts of Parliament were passed in the space of *one* year.

The rail-road on the first plan, was to commence at the canal near the town of Brecon, to ascend the hill to Blaen Brynich, to descend to Brwynllys and the Hay, to cross the Wye, by a Bridge near Whitney, and to extend seven miles more to Parton's Cross, in the parish of Eardisley in Herefordshire; where one main road leads northward to Kington, a second eastward to Leominster, and a third S. E. to Hereford: the whole length $22\frac{1}{2}$ miles. On this line, the summit of the first three miles was to be gained by a rise of 309 feet, equal to 15 inches in every 22 yards; but this obstacle to free commerce was not seen till after the first Act had passed in 1811. A second engineer was employed, who planned a line commencing at the same spot on the canal, but kept more upon the level on the right, so as to gain the summit at four miles five furlongs, with a rise of only 154 feet two inches; being

ROADS.

only 5 inches in every 22 yards : with a gradual
on 10 miles, from the summit to Glasbury, of 5
s in every 22 yards ; and on 4 miles from Glas-
to the Hay, of 3 inches in every 22 yards ; and
thence to Eardisley, 7 miles, a fall of half an
in every 22 yards.

his second plan being preferred, a second Act was
ned in May, 1812.

e *second* engineer maintained that the hauling of
of coal from Brecon to Eardisley by the *first* line
d, would cost 3s. 9d., and by his *second* line only
l. ; and that the back carriage would be still more
ed, owing to more gradual ascent and descent,
h the extent of line be considerably greater.

e *first* line of road, 22½ miles, was estimated by
rossley—single, at 41,100l.—double, at 60,250l.
e same line of road, measured 23½ miles, by Mr.
kinson, was estimated by him, including pur-
of land, fencing, and all, &c. at 57,603l. 18s.

luded to, at about one half its present price from the Clee Hill; and corn will be delivered in the coal tract in greater plenty, and at a reduced price.

Another line of rail-road was proposed from Abergavenny to Llanfihangel Kil Kornel, $8\frac{1}{2}$ miles; and from thence to Hereford, 16 miles; in all $24\frac{1}{2}$. At Hereford, a ton of the Forest of Dean coal sells for 32s.; Welsh coal, superior in quality, and owing to so great a distance of land carriage, sells for 45s. a ton; but by the rail-road, it is supposed it might be afforded at 25s. a ton. On this line, by the customary land carriage, the turnpike tolls for five horses, amount to a sum nearly equivalent to the whole carriage of an equal quantity of coal by the rail-road.

These roads are the most interesting in an agricultural view; the others are mostly of a more private nature, for the conveniency of bringing materials to the blast furnaces, conveying coal, iron, &c. to the several sea-ports, &c.: we may, however, mention one rail-road, on which a carriage of pleasure travels.

"A rail-way has been carried, within the last three years, from Swansea to the Mumbles, along the sea shore, the distance about five miles; by which coals and manure are brought down, and limestone is taken back. A car, upon tram-wheels, and carrying about 16 or 18 persons, goes and returns twice every day, during the summer, from Swansea down to the Mumbles, each passenger paying 1s. fare: it is convenient for seafaring people and others; and the proprietor amply repays himself, who has permission from the rail-road Company to run this car, upon paying a small sum annually."—*Rev. J. Collins*, 1811.

The maritime part of Caermarthenshire, Llanelly, and Kydweli, has of late been very active in planning

ROADS.

erent communications by means of rail-roads, &c. ;
that in a few years, if matters go on smoothly, the
-roads of South Wales, including as we ought
mouthshire, may without exaggeration be esti-
ed at 200 miles, in the open day ; exclusive of
es of miles under ground, in the horizontal drifts
evels of the coal and iron mines. It is said that
Company in Merthyr Tudful, has 30 miles of rail-
s under ground ; which, with the tram-waggons
other appropriate implements, were, upon a late
asion, valued at 50,000*l*. The 200 miles above
und, including the value of the land, may be esti-
ed at 400,000*l*.

n about seven or eight years after the first intro-
ction of rail-roads into South Wales, they were su-
seded by roads constructed upon a superior prin-
le, called here, by way of distinction, *tram-roads*.

Mr. Outram, in his Report to the Brecon Canal
npany, in 1799, makes the following observations

stouter, have higher flanches, and are cast in shorter lengths: each of my rails being one yard in length, and weighing, on some public works, as much as 44 lb. each rail; on others as low as 32 lb. each. The construction of the roads is as follows:—The ground is first formed in the best manner the nature of it will admit, and perfectly drained: then covered with a bed of small stone or good gravel, six inches in thickness, and four yards in breadth, for a single road, and six yards for a double one: on this bed, stamped firm, are placed blocks of stone for sleepers for the rails; each block being upwards of one cwt.; in the centre of each block a circular hole is drilled six inches deep, and in it is put an octagonal plug of oak five inches long, which receives an iron spike, that fastens down the ends of the two rails that rest upon the block: the spaces between the blocks are filled with small stones, which are rammed close about the blocks, and covered with gravel, but not so high as the soles of the rails outside, nor so high as the top of the flanches on the inside between the rails, which in some roads are three feet six inches, in others, four feet two inches asunder. By proper attention to these matters, and the particular formation of the rails, they always keep clean; so that the waggons pass without the smallest obstruction. The rails rest on three inches at each end, where their under sides are thickened to give them solid bearings: their flanches are higher in the middle than at the ends; and each rail forms a bridge between block and block, and renders the road firm, and uncommonly durable.

“ The waggons carry from 30 to 50 cwt. each: the axes are fixed at three feet asunder; so that at the instant the hinder wheel of the carriage comes upon the

end of the rail, the fore wheel is quitting the other end; and the rail is never loaded with more than one-fourth of the waggon at once. Wherever the country will admit, the rail-roads should be laid on a gentle declivity, so that the loaded waggons may have no tendency to run of themselves, but that the horse may rather have occasion to pull a little at his load: this will be the case at one-fourth or one-third of an inch fall to the yard: at two-thirds of an inch the waggons will have a tendency to run, but so gentle, that six or eight full loaded ones will not distress the horse that takes them down, nor be too much for him to return with when emptied: where the descents are greater, it becomes necessary to lock one or more wheels; which is done by putting a slipper under the wheel to be locked: but in cases of much descent, it is better to construct inclined planes, and apply the descending loaded waggons to raise the returning empty ones.

“ On roads thus constructed, one ordinary horse and a boy would bring from the collieries to the canal, ten or twelve tons of coals, in a gang of six or eight waggons; and would take back a like number of empty waggons with the greatest ease. A stout horse would on occasion work double those weights; and supposing trade sufficient to employ three men at the inclined plane, the expenses of passing the loaded waggons down such rail-way would not exceed one halfpenny *per ton per mile*; and the expenses of repairs would be infinitely less than on the present rail-ways.

“ A rail-way, from the end of that of Clydach to Abergavenny, to supply that town, and the country east of it, with coal and lime, would be three miles
in

in length : the rails for it would be worth 1600*l.*; and the cost of all other articles, workmanship and fencing, would amount to 1400*l.*, exclusive of the purchase of land and the wharf. The expenses of ganging or drawing along these rail-ways, the coals from Llwyd Coed collieries to the bridge near Abergavenny, a distance of eight miles, would not amount to eight-pence per ton, including the repairs of waggon and oil : from the nearer collieries the expense would be proportionally less ; and limestone from the quarries would be ganged to Abergavenny bridge for four-pence per ton, including oil and repairs : for two horses, with one boy to drive them, would take down 20 tons each trip ; and with a third horse to rest each alternately, two trips per day would readily be made ; so that three horses would take down 40 tons each day.

“ On the whole, it is clear that the advantages which would result to the public from the completion of rail-ways as above stated, would be exceedingly great ; and although the execution of them would be attended with considerable expense to the proprietors, the savings that would accrue, and the very great increase of trade that must take place in consequence of the material reductions in the prices of coals and lime, would doubtless insure a speedy return of the expenditure, and a perpetuity of incalculable benefit.”

BRIDGES, considered as links connecting chains of roads, deserve notice in this Section.

The best formed bridges are to be expected in the southern part of the district, where freestone quarries occur. The lias limestone rocks, arranged in parallel layers of regular thickness, afford good materials. The western parts of the slate tract abound with strata

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of

ROADS—BRIDGES.

venient thickness for building arches, and may be secured of great lengths.

In parts of the shale tract, where veins of grey main rock do not occur, materials for bridges are very scarce: here, most of the old bridges are of stone; and when they decay, it will be found both difficult and expensive to replace them.

Wales had no very elegant stone bridges to boast of, about the middle of the last century, when a great genius appeared in the mountains of Glamorgan, and brought the art of bridge-building to a considerable degree of perfection. William Edwards was the *pontifex maximus* of his day; and had a more legitimate claim to the title than either of their predecessors the Popes of Rome. Mr. Malkin, in his History of South Wales, 1804, has given a very interesting biographical account of this celebrated character, and his professional undertakings.

In the year 1746 to 1755, William Edwards

immediately entered upon erecting a third bridge (all for the simple contract of the first); and to preserve equilibration, the want of which had destroyed his second bridge, he contrived three cylindrical apertures over the haunches at each end; the lowest aperture being nine feet, the second six, and the uppermost three feet in diameter; and so disposed, that the periphery of a circle passing through the centre of each aperture, would be parallel or regularly concentric with the curve of the arch, which forms a segment of a circle, whose chord is 140, and radius 175 feet; this was completed in 1755, and is supposed to be the largest arch in the world. This bridge, in prints, is styled "the celebrated bridge over the Taff"—in maps, it is called Newbridge, and by the Welsh, *Pont y ty Prydd*. This elegant arch, so much admired by the amateurs of picturesque scenery, is nevertheless very inconvenient for passengers, owing to its abrupt loftiness. This error in the architect's first attempt, he ever afterwards avoided.

"Thus," says Mr. Malkin, "Edwards discovered, not by reading, conversation, or any other mode of extrinsic instruction, but by dint of his own genius matured in the school of experience,—that where the abutments are secure from the danger of giving way, arches of much less segments, and of far less altitudes than general opinion had hitherto required,—are perfectly secure, and render the bridges much easier for carriages to pass over, and in every respect adapt them better to the purposes of a ready and free communication. Impressed with the importance of those rules, by which he had assiduously perfected his own practice, he was in the habit of considering his own branch of architecture as reducible to three great requi-

ROADS—BRIDGES.

durability,—the freedom of the water flowing and the ease of the traffic passing over. These are the only maxims of peculiar importance in bridges of this arch, which are not only the best adapted to places where tremendous floods occur; but, in mountainous places, are the only bridges securely practicable in narrow valleys."

Bridges built by *W. Edwards and Son.*

	River.	County.	Arches.	Span or	Height from	
				Chord.	Chord.	
				<i>Ft.</i>	<i>Ft.</i>	
	Taff	Glam.	1	140	35	{ Wider by 42 feet than the Rialto in Venice.
	Usk	Monm.	—	—	—	
	Tawy	Glam.	3	—	—	
Wye	Tawy	Glam.	1	80	—	{ One aperture over each end.
	Amman	Caerm.	1	45	—	
	Towy	Caerm.	1	84	—	One ditto ditto

is not here the boundary between it and the county of Brecon, as it is in every other part, from the Hay to the Aber or fall of the Elain, a space of about 30 miles: a circumstance apparently unknown to map-makers and topographers. At Glasbury the county of Radnor protrudes southward over the Wye, includes the church, and a considerable tract of the parish, amounting to a rental of 554*l.* according to the assessment of William and Mary.

Edwards's stone bridge was the third built by the county of Radnor at Glasbury almost within the memory of man. The first bridge of wood fell in 1738: the second also of wood fell about the year 1775. In 1777, the third bridge (No. 9 in the foregoing list) was built of stone by William Edwards; who insured it for fourteen years. It stood the term, and four years more. Notice was given to the trustees by the surviving architect, for the father had ceased from his labours in 1789, that the foundations were in a dilapidated state, owing to the undermining of them by the floods. In general, "what is every body's concern is nobody's:" so was the case here; the repairs were deferred till February 1795, when the great flood, known by its ravages in several parts of the kingdom, caused this elegant structure to follow the fate of its wooden predecessors. The soil being sandy loam to an unknown depth, it was not deemed adviseable to risk the expense of a fourth bridge of stone; consequently it was built of wood in 1800, upon light piers of freestone. It is the most elegant wooden bridge in the Principality: its Welsh name is Pont y Clâs.

Edwards's bridges all declare their architect at the first view. Before his time, all our stone bridges were semi-

ROADS—BRIDGES.

i-circles; but since, his segment arches have been
tated by other masons; who succeed well, where
materials are appropriate.

ur bridges, nevertheless, are not half so numerous
hey ought to be, for the convenience, and even the
ty of travellers.

In Glamorgan, bridges are less deficient in num-
than in most counties; but too much so, consider-
its profusion of materials. Between Llandaff and
vbridge, the Taff flows 10 miles without a bridge;
that in an important part of the country. Neath
Pont Nedd Vychan are 12 miles distant, with *one*
mediate bridge, where two at least are greatly
ted. Tawy, Elai, Cynon, Rhondda, and Dawon,
in the same predicament."—*E. W.*

The Teivy is better supplied with bridges than
t Welsh rivers; having thirteen from Strata Flo-
a to Cardigan. The Towy is not so well fur-
ed; a bridge is intended, where it has long been

SECT. II.—CANALS.

IN every country exporting heavy articles, canals are of the highest importance ; as, without either them or rail-roads, the proprietors of coal and iron mines, in the interior of a hilly tract, could not bring their produce to market without evident disadvantage ; the constant and expensive land carriage necessary to bring those ponderous articles within reach of shipping, would be the ruin of the roads, as well as of the parishes they pass through ; when made, the proprietors of the canals, the proprietors of the mines, and the public at large, are mutually, if not equally benefited, by a quadruple reduction in the price of carriage.

South Wales owes its canals and tram-roads entirely to its productive mines of coal and iron ; and within these 24 years, upwards of six score miles of canals have been completed within it, including Monmouthshire, to which we lay claim, now when kidnapped and usurped territories are every where claimed by their rightful owners, and justice is again permitted to hold the balance ; and these canals were mostly planned and formed during a most trying period of respiteless war, unexampled in its exertions and expenses in the annals of history ; when false prophets predicted the annihilation of commerce and the ruin of the nation ; it was then that Britons, even more active than in the repose of profound peace, were planning and executing modes of easy and cheap conveyance for their saleable commodities, as if all the ports of Europe and the world had been open to them. This is no bad trait in the national character.

Wales in most things, excepting in the elevation of
its

its mountains, keeps a proper distance in the rear of England; the latter, however, had not made much progress in canals, before South Wales began humbly to imitate. We had a canal, either made or in making, when the Act for the Grand Trunk Canal passed in 1766. From that period to 1790, little or nothing was done; from that year to the present, South Wales has not been altogether idle in furthering its inland navigation, as will appear by the following table:

Canals.	County.	Date.	Miles.	Locks.	Fall in Feet from the Summit Level.
1. Kydwelli	Caermarthen	1766	3		
2. Cremlyn	Glamorgan ..	1789	3		
3. Merthyr Tafful	Glamorgan ..	1791	26	40	568
4. { Branch to Pont y Pool } { Ditto to Cremlyn }	Monmouth ..	1791	{ 11 .. { 11 ..		447 365
5. { Brecon and Abergavenny	Brecon }	1793	33	6	68
6. Neath	Glamorgan ..	..	12		
7. Llansamled	Glamorgan ..	..	8		
8. Swansea	Glamorgan ..	1794	17	36	373
9. Aber Dâr	Glamorgan ..	..	7	2	
10. Penclawdd	Glamorgan ..	1812			
11. Llanelly	Caermarthen	1812			

1. *Kydwelli Canal* (vulgò Kidwelly) was made by the late Thomas Kymer, Esq. with rail-ways and wharfs. The proprietor had an extensive coal estate upwards of three miles from the harbour, which, owing to the bad state of the roads, was of little or no value; but since the completion of the canal, has turned out a source of considerable emolument to his representatives.

2. *Crem-*

2. *Cremlyn Canal* is also private property, and made, like the former, to expedite the conveyance of coals from the pits to the mouth of the river Neath, which theretofore had been sent by a troublesome land carriage to the mouth of the Tawy river. It was necessary to form this canal through part of Cremlyn bog, which for some time baffled the skill of the engineer; but, through perseverance, the navigation was at length completed. This is commonly called the "*First Neath Canal*;" and we have presumed to give it the above appellation for distinction sake: it extends from Briton Ferry on the east, to Pont Gremlyn on the west.

3. It was scarcely possible that the great increase of trade and manufacture in *Merthyr Tudful*, would long remain destitute of the advantage of water carriage. A great part of this line was difficult of execution. The valley of the Taff is narrow, the hills in some places protruding precipitously to the brink of the river. These would have been serious obstructions in many places; but in being between Merthyr and Cardiff, they happened to be in the right spot. One iron-master, we were informed, subscribed 40,000*l.*, amounting nearly to half the expenses.

The canal was navigable for about 12 miles, from Merthyr to Newbridge, in the year 1793. On this part of it, near its junction with the Aber Dâr canal, there are 18 locks within the space of one mile; out of which 11 locks are in such quick succession as to occupy only one quarter of that mile. In the year 1795, it was navigable for other 12 miles to Cardiff; and from thence a capacious bason extends to Penarth harbour, capable of sailing vessels of 400 tons. This is
secured

CANALS.

by a tide lock. In June 1798, a naval procession took place, in celebration of the opening of the canal to the sea, attended by firing of guns, and the presence of the harbour, belonging to the few nations at the time of the English, entering the bason with their regiments flying.

The canal is crossed by upwards of 40 bridges, and crosses over the Taff in an expensive aqueduct, soon after leaving the Aber Dâr branch. On crossing the aqueduct, it occupies a capacious bason ; where, at a commodious wharf, ends a ten mile rail-road from Merthyr Tydfil, which runs parallel with the canal, but on the opposite side of the river. The Act for this road was passed in 1825, and has been the first of the kind ; and upon it, in the month of February, 1804, was tried an experiment of the power of steam, when 10 tons of iron and 70 tons of coal were drawn nine miles by the agency of a Trevithick engine.

shire, were conveniently situate within a moderate distance of the navigable river Usk: the 22 miles of canals, above described, pervaded a considerable portion of the mineral tract; and the deficiency was supplied by the more appropriate conveniences of rail-roads, from the upper ends of the two canals to the more distant works.

	Miles.	Rise in Feet.	Rise per Yard.
From the extremity of the northern canal at Pont Newynydd, a rail-road extends parallel with the river Avon to Blaen Avon furnaces,	5½	610	¾ inch.
From Pont y Pool to Trosnant furnace,	1	—	—
With a branch to Blaen Dir furnaces,	½	—	—
From the extremity of the southern canal at Crenlyn bridge, parallel with the river Ebwy, and crossing the northern branch of it,	3	139	⅞ inch.
This road continued along Ebwy Vawr river, by Ebwy Vale furnaces, to Beaufert iron works, in the county of Brecon,	7	480	⅞ inch.
From near the extremity of the last road to Sirhowy furnaces,	1½	—	—
A road from the junction of the two Ebwy, along the Ebwy Vach, to Nant y Glo works,	6½	518	½ inch.

To these may be added other rail-roads that are not so immediately connected with the Monmouthshire canal; such as at Romney or Union iron-works on the border of Brecknockshire, to limestone, &c. 3½ miles, Trevil, 5 miles, Blaen Avon to limestone 6 miles, Llanhyddel coal, 4½; and from Tredegar furnaces down to Newport, 26 miles; besides others of which we have had no information.

The tonnage on this canal for one year, ending
9th

9th September, 1799, was coal about 29,000 ; iron in pigs, bar, and cast, about 12,000 ; iron ore about 2000 ; sundries, including timber, bark, slate, lime, 1528 ; in all, 44,528 tons. This canal is said to have cost in making 250,000*l.* In the quarter ending October 13, 1813, 1100 vessels cleared out at the port of Newport, where this canal terminates ; of which number 963 were coastwise, and 137 foreign.

5. The *Brecon and Abergavenny Canal* is the only one as yet in the district, which originated with the consumers ; being undertaken with the laudable view of lowering the price of coals, lime, &c.

The first Act was procured in 1792, and the design then was to form a canal from the town of Brecon, to coal and limestone at Clydach, and from thence, proceeding opposite to Abergavenny, to join the navigable Usk at Newbridge, about four miles below the town of Usk : but a compromise taking place between the proprietors and those of the Monmouthshire canal, the latter paying the former 3000*l.*, it was agreed to join both canals at Pont y Moel, below Pont y Pool ; and another Act for that purpose was obtained in 1793. The cutting did not commence till April 1796 : the first portion made navigable was from the Clydach vicinity of coal to Llangynydr bridge, $8\frac{1}{2}$ miles ; and from thence, 10 miles more to Brecon, was completed in December 1801 ; which had the immediate effect of reducing the price of coal in that town, from 12*d.* or 14*d.* per cwt. to 9*d.* ; and lime was so reduced, that a farmer would save but 5*d.* a barrel of 30 gallons, by going to the kilns at Llangynydr wharf, 10 miles distant.

Almost the whole of this line of canal is in the red sandstone

sandstone tract, with pervious soil and open strata : of course, making the canal water-tight, by puddling, was a tedious and expensive process. This, probably, was one cause that the proprietors were a good while in suspense, whether they would complete the junction from Clydach to Pont y Pool, $14\frac{1}{4}$ miles, by a canal or by a rail-road. In 1799, Mr. Outram, the engineer, made his observations with regard to this point, in the following words :

“ I have examined the line of the proposed canal between Clydach and Pont y Pool, and observe it to be on the same kind of open strata as that on the northern part of the line, except near the south end, where the soil appears of a better kind for holding water ; and am of opinion the execution of this $14\frac{1}{4}$ miles of canal, cannot be completely perfected for a less sum than 44,000*l.* exclusive of the purchase of land and temporary damages, which I suppose will amount to 6000*l.*, making together 50,000*l.*

“ A rail-way, of the best construction, would be laid along this line for 19,000*l.* exclusive of the purchase of land and damages, which would not be half as much as for a canal ; but rating it at half, the whole expense of the rail-way would not exceed 22,000*l.* As to the comparative expenses of conveyance on canal and rail-way, they must be considered as follows : a canal on the part of the line in question, would be on a perfect level, unobstructed by locks, and of course as favourable as possible for navigation. A rail-way on a perfect level is more expensive to work, than one that has a gentle fall in the direction of its greatest trade ; but on a rail-way perfectly level, with waggons of the best construction, three horses managed by one driver, will draw 15 tons at the rate

of $3\frac{1}{2}$ miles per hour. The tonnages to the Company would be the same on a rail-way as on a canal. The freight on a canal, including wear and repair of boats, would cost more than 1*d.* per ton per mile. The expense of ganging, including wear and repair of wag-gons, would not amount to $1\frac{1}{2}$ *d.* per ton per mile, so that in the question before us, the canal would have the advantage of about one farthing per ton per mile, or 4*d.* per ton on the whole length between Clydach and Pont y Pool; and on articles passing between Brecon and Newport, the advantages in favour of the canal would amount to 5*d.* per ton, on account of the re-loading on the rail-way plan, it being already canal between Clydach and Brecon.

“On the other hand, coals, lime, or other articles to be delivered at the Goedref, or any intermediate part of the line, would be conveyed full as cheap by rail-way as by canal, because by continuation on rail-way, the expenses of shipping and unshipping would be avoided: and if the Company should think proper to substitute a rail-way instead of a canal, for the sake of saving the expenditure of 28,000*l.* they may perhaps make some abatement of tonnages to compensate for the difference of expense, on such articles of thoroughfare trade as may appear to require it: and in case a rail-way should be adopted, care should be taken in its execution, to throw no impediments in the way of the future execution of the canal, when extensions beyond Brecon, or other increase of trade, may render necessary a complete water communication.”
—B. O.

Here, Mr. Outram made no positive decision, though he seemed inclined in favour of rail-roads, even upon level land which did not require one lock.

Engineers

Engineers may be biased on one side or the other: a writer in the *Ag. Mag.* No. 59, p. 409, calculating the difference of expense between a canal and rail-road conveyance on the proposed Surry Canal, from London to Portsmouth, decides highly in favour of a canal; saying that 60 tons of corn could not be transported from one to the other, 70 miles, on an iron rail-road for less than 125*l.* 10*s.*, or 7*d.* per ton per mile; but by a canal for 49*l.* 5*s.* or 2½*d.* per ton per mile. The truth is commonly found between the two extremes. Where trade is great, capital is not wanting; and, there, canals are without question to be preferred, if practicable: in places of less trade and less capital, rail-roads are the most advantageous.

The proprietors of the Brecon canal, however, decided in favour of a canal, which was completed, the whole length of about 33 miles, in December 1811, at the total expense of 170,000*l.* nearly double the original estimate!

Such was the public expectation of the usefulness of this canal, in an agricultural view, in lowering the price of fuel and manure, that at the commencement 120,000*l.* was immediately subscribed; and some of the original shares in a few weeks sold for double. Owing, however, to unforeseen difficulties in the execution of the plan, it turned out, for several years, a speculation considerably below *par*: but since its completion, and in the prospect of an extended trade into the west of Herefordshire, &c. by the new railroads over the Wye, it bids fair for being a profitable concern.

This canal has only one tunnel, of 220 yards, just at its junction with the Monmouthshire canal: it has 62 stone, and 14 wooden bridges, 11 aqueducts, and 31 culverts.

culverts. Its chief feeder is a copious stream from the Usk at the summit level; besides 185 locks of 180 tons of water each in the 24 hours, gauged in the dry season of summer, and supplied from five streams in different parts of the line, exclusive of smaller brooks.

The rail-roads connected with this canal, for bringing down coal and limestone, &c. from the Clydach, &c. amount to about 10 miles: a rail bridge was also constructed over the Usk, near Glan Grwyney forge, at 1200*l.* expense; which was thrown down by the great flood in Feb. 1795, and never rebuilt.

The fall along the water communication from Brecon to the Bristol Channel, is 420 feet, upon a very variable scale:

	Miles.	Locks.	Fall.
From Brecon to Clydach,	18½	6	<i>Fect.</i> 68
From Clydach to Pont y Moel,	14½	Level	—
From Pont y Moel to the Usk at Newport,	8½	34	340
From Newport to the Channel,	—	—	12
			420

6. *Neath Canal* begins and ends in the coal tract: it extends from the navigable part of the river, near the town, to Aber Gwrelych, almost as far as Pont Nedd Vechan, on the border of Brecknockshire; and has a very considerable trade in stone coal, culm, iron, limestone, fire clay, &c. This canal is connected by a line of rail-road with the canal of Aber Dâw, No. 9, which is joined with the Merthyr Tudful canal, No. 3.

7. *Llansamled Canal* is private property; the third of the kind in the district under survey: it was made by

by John Smith, Esq. to convey bituminous coal from his estate to the copper-works, and to the mouth of the Tawy for exportation: its usual name is the "*First Swansea Canal*," but for the same reason as before given in No. 2, we have given it this more distinctive appellation, begging the proprietor's pardon.

8. *Swansea Canal* extends from that town to Hen Neuadd in Brecknockshire, about 17 miles, parallel with the river Tawy. The inducement to apply for an Act in 1793, was expressed in the following terms: "The valley of Tawy, through which this canal is intended to pass, for the extent it goes, abounds with, and is perhaps unrivalled in its productions of coal, iron-ore, and limestone; but for want of a communication by water, such thereof as lie far up the valley, can neither be exported, manufactured, nor applied to the improvement of the country."

"The port of Swansea affords evident proof of an increasing demand for coal: in 1768, the vessels entered were only 694, register tonnage but 30,631: in the year 1793, the number of vessels was 2028, the tonnage 120,822. These vessels mostly come for coal, recently advanced 5s. per weigh of 216 Winchester bushels; and it is a well established fact, that vessels often wait several weeks for a turn to load, and are then obliged to proceed to other ports in search thereof, a matter of the highest import to the counties of Somerset, Devon, and Cornwall, as well as other places which are supplied from thence."

This canal and Neath canal, as well as their respective valleys, run parallel from south-west to north-east; being divided only by a range of uplands, well

CANALS.

h coal, iron-stone, building-stones, tiles of
s schist, &c.

er Dâr Canal connects the iron-works of
and Aber Nant with the Merthyr Tudful
which it joins just as it enters the aqueduct
Taff. This canal runs parallel with the
on, seven miles, with only two locks, and a
at its exit into the Merthyr canal. This
completed in 1811.

enclawdd Canal, on the northern coast of
the parishes of Llanrhidian and Lloughor,
d in conveying excellent bituminous coal to
ing in Burry river, and fuel, &c. to the
orks at Penclawdd, erected about 33 years
guous to beds of coal which have been since
by the Cheadle Company, which has lately
the concern to other adventurers.

debie, to the Vale of Towy near Llandeilo; and up that vale to the neighbourhood of Lord Cawdor's extensive and rich lead mines. This canal promises great advantages to the adventurers, and will be productive of infinite good to the neighbourhood at large, by conveying fuel and manure to those parts that now stand in need of them; and affording a ready outlet to the mines, coals, and other productions of the country."—*Orig. Report*, p. 44, 1794.

Unfortunately, water, too cold even for a canal, was thrown upon the scheme, and it was for the time abandoned. The years 1810, 1811, and 1812, were years of uncommon activity, in projections and counter projections, in the three commots; and among other topics of public improvements, the Grand Towy Canal became again repeatedly, and in divers forms, the subject of canvass. When Peace, now upon its march, returns from abroad, may all be peace and unanimity at home; and in that favourable crisis, may the Grand Towy Canal be taken earnestly in hand, and completed; to the certain emolument of the subscribers, and the no less certain and incalculable improvement of the whole tract of the Vale of Towy above Llandeilo, and its vicinities; even the hundred of Bualt in Brecknockshire, and the eastern parts of Cardiganshire, would experience the beneficial effects of reduction in the prices of fuel and manure; and of a cheaper conveyance of the produce of the country to a sea-port.

A proprietor of a very considerable estate within the influence of the line in question, was of opinion that gentlemen should subscribe liberally towards it, were they to receive no interest, but to expect ample remuneration in the improvement of their estates: he would

CANALS.

on that expectation. Another proposed an-
ticipating powers to levy contributions on all estates
to be improved by means of the intended canal,
in proportion to their extent, and other circumstances
to be justed by commissioners. We trust, however,
that a canal, from the river Burry, through the coal,
lime, and building-stone tracts, to the extensive
Vale of Towy, Llandovery, and Cil y Cwm
may be completed by the ordinary means of
navigation; without having recourse to means
repugnant to the principles of the British Constitution.
The whole length of this line of canal, with its
tributaries, might be extended to from 50 to 60 miles.
The lead mines at Cil y Cwm, in the north-
western extremity of the Vale of Towy, are said to be
very rich; and it is not improbable that more lead
might be concealed, in a line from south to north, be-
tween the Vale of Towy and the Teivy.
The writer of "An Authentic Description of the

On the two points, a canal from the port of Caermarthen to Llandovery, and the junction of that canal with the Brecon canal, it need only be observed, that the former would bear no comparison, in profits and agricultural advantages, with a canal from a convenient shipping place on the river Burry, through the collieries and lime rocks; and that the latter, granting it practicable, is too wild a speculation to require a thought.

Another canal was lately in agitation, from Llanelly Dock to Gwili bridge, in the parish of Llangennech.

Pembrokeshire, though rich in coal and limestone, is more indebted to Nature than to Art for its inland navigation. Milford-Haven receives limestone from parts of its rocky coasts; and continues navigable in its numerous branches and creeks quite through the coal tract; however, a canal connecting Creswell Quay, on Milford-Haven, with Caermarthen Bay at Sander's Foot, about eight or nine miles, could not fail of highly improving the value of collieries in that tract of country.

We shall quote Mr. Hassall on this subject, as few alterations have taken place since he wrote in 1794, excepting a few steam-engines, &c.

“ The collieries have a material influence in checking the progress of agriculture in the part of the county where they are situate. No canal navigations, no rail-ways, have yet been established for carrying the coal and culm of these collieries to the shores and creeks where they are shipped. All the carriage is done by carts, drawn by two oxen and two horses, to the total ruin of the roads. And as this business employs the country people during all the spring and summer months, they pay very little attention to the cultivation

CANALS.

ivation of the ground. It is a kind of dissipated which the carters become fond of; affording frequent opportunities of tippling, and having fewer hours of labour than the steady works of agriculture.

Horses are employed in drawing water from many of the coal-works; steam-engines have not been introduced; and water-wheel pumps can only be erected in particular places: so that it seems the particular province of coal proprietors, to consider how much the application of canals, rail-ways, and steam-engines would increase their profits, by abridging the expenses of working the collieries.

In order to shew what is expended in the carriage of coal, I have procured an account of the quantity exported from the county in one year, and find the quantity of coal and culm, exported and carried coast-ward, to amount to 60,523 chaldrons, Winchester measure. Half this quantity may be allowed, as situated near to the shipping, as not to admit of any im-

“A most important advantage remains to be noticed, as the immediate consequence of introducing canal navigation: the teams and people now employed in carrying our coal and culm to the shipping, would become subservient to agriculture. The whole country about the collieries would soon be cultivated and improved, which now lies in neglected sterility; and the scarcity, which in the present way of management frequently prevails among these useful people, the colliers of Pembrokeshire, would no more be heard of. Thousands of acres, which now contribute hardly any thing towards the support of man, would soon become productive, and increase to perhaps four times their present value.

“There are numerous situations where rail-ways may be constructed to great advantage, by which considerable savings may be made, independent of the foregoing calculations. Nothing should be omitted to render the working of these valuable collieries productive, since it is asserted that none of the rival collieries of South Wales yield coal equal in quality to the Pembrokeshire coal.”—*Original Report*, p. 58, &c.

SECT. III.—FAIRS.

IN the infancy of society, before assemblages of houses formed towns, marts for the barter, and, finally, for the sale and purchase of commodities, through the medium of bullion or money, were established on open down or hills. It was prudent, if not necessary, in such feudal ages, to hold such marts on what may be termed exploratory mounts, in order to preclude surprise from freebooters.

Some

FAIRS.

Some relics of those Tartarian ages are still in being, where numerous fairs, well attended, are kept within one house or two, exclusive of temporary booths to accommodate the frequenters; such as at *Twyn y* *un*, near Merthyr Tudful, and *St. Mary Hill*,

Cowbridge, in Glamorganshire; *Hawy* in Radnorshire; *Rhos* and *Capel Cynin*, in Cardiganshire,

Many marts, similar in point of situation, have been discontinued; and other fairs have been established in lieu of them, in more commodious places.

The number, as well as dates of fairs, are occasionally varying, for the better accommodation of the public. From books of fairs, &c. we have formed the following table, shewing the number of fairs in each county; by which it appears, that there are about 341 fairs kept within the six counties, in the course of the year.

when farmers proportion the number of stock to their winter keep.

Milch kine, dairy utensils, &c. mostly in April and the beginning of May.

Sheep, yearlings, two year olds, and couples, in the spring and May fairs: weaned lambs, and wool, in June, July, and August: wedders from the hills, and store ewes, &c. in October.

Horses of some kind are exhibited almost in every fair, and so of every other species of stock; but the greatest demand for young horses is in the fairs of May and June: a price refused in those fairs will hardly be offered again in subsequent fairs during that season.

Strong hogs are mostly sold from the stubbles, and store pigs for winter stock bought in their stead, at the October fairs: suckling pigs at all seasons: store pigs are also in request at the commencement of the dairying season: fat hogs are sold at the December fairs.

Servants are hired, in the eastern counties, at the April and May fairs; in the western counties more are hired in the autumn fairs than in the spring. At *Cil y Cwm*, in Caermarthenshire, there is but one fair in the year, and that purposely for hiring servants, on the 12th of November. At Aberystwyth, the first Monday in November, and the first Monday in May, are called *Hiring Mondays*, where great numbers meet to hire and be hired. We would recommend the 1st of January, as the most proper period of commencing the year of servants.

Mercery, drapery, saddlery, coopery, pedlary, &c. are exhibited for sale at all seasons of the year.

Cheese, salted butter, &c. are sold in the autumn fairs; dried bacon in the winter and spring.

Salted

FAIRS.

Salted butter is commonly preserved and packed up in casks or *firkins*, according to the statutes. In some parts, of inland trade, either the penalties of the statutes were never promulgated, or butter in *tubs*, open top, and covered when packed off with strong clean linen, is found preferable upon the whole to the firkin or barrel butter. In such parts, many would not believe that butter is any where preserved in firkins like herrings or oysters. We never heard of *qui tam* informations being laid against the vendors of this tub butter: perhaps those legal gentry are somewhat timid, lest in the prosecution of their office, they should not "be dealt with according to law." These butter tubs are sections of cones, a few inches wider at top than bottom, for the ready turning out of their contents for weighing; when the buyer has the advantage of the use of three of his senses to judge of the quality. Each tub contains, according to the dairy, from 60lb. to 120lb.: larger sizes being not easily made.

SECT. IV.—WEEKLY MARKETS.

IN addition to fairs, increased and gregarious population in cities, towns, &c. required weekly markets, for the supply of the inhabitants with the necessities and luxuries of life.

The inhabitant of the single dwelling at the Tartarian mart, already noticed, at Pen y Waun, near Merthyr Tudful, is said also to boast of a charter for keeping a weekly market there, granted by Gwrgant, Prince of Glamorgan, in the 11th century. How a market could ever be supported there, before Merthyr began to assume its present consequence, is not easily known. In old books of fairs, however, it ranks first of the Glamorganshire markets. It has at length met with too powerful a rival in its neighbour Merthyr Tudful, which has three market places, two weekly markets on Wednesdays and Saturdays, besides every alternate Monday, to supply a population of about 11,000.

Towns having formerly but one market a week, are now supplied with two. Haverfordwest had but one in the reign of Elizabeth, as appears by G. O.'s history at that period; whose words are here quoted.

“There are three market townes in Penbrokeshire, (viz.) Penbrok, Haverfordwest, and Tenby; the second whereof being seated in the midst of the sheere, and most convenient for trade, is greatly frequented of the countrey people, and therefore is the greatest and plentifullest market of the sheere, and is kept once every weeke on the Saturday; wherein me thinketh the towne is verie backward in their owne profit, in
not

WEEKLY MARKETS.

...suing for another market in the middle of the
ke; which would be to the great good of the
ne and countrey. Also they have but one faire in
yeare, whereas if there were more purchased from
majestie, it might be beneficial both for town and
ntrey. This market of Haverfordwest, is thought
be one of the greatest and plentifullest markets that
within the marches of Wales. Penbrok market is
be on the Saturday, and Tenby on Saturday, and
Wednesday for corne.

These two townes for their markets, are much in-
for for plentie of victuals and corne to that of Ha-
fordwest, by reason those townes are seated, one
y near the lower part of the sheere, and much hin-
ed by reason of a ferrie on the one side; and Tenby
meth as it were a towne running out of the countrey,
stayed on the sea cliffe; by reason whereof they
d not so commodious for resorte of people, which
meth less trade and utterance in their markets: but
these townes being seated in a more fruitful soile

bandman buyeth in the 6 monthes of Dec. Jan. Feb. March, April, and May, he buyeth all to be payed for at the faire dayes, when he may have money for his cattell; and by this means the riche man eateth up the wealth of the poore man."—*Hist. Pem.* 1560.

The deficiencies here complained of in the markets and fairs of Pembrokeshire, which might be equally applicable to other places at the time, were gradually supplied, by the establishment of two weekly markets in the principal towns, and by the conversion of some market-days, at particular seasons, into fairs, for the sale of live stock.

The spring markets, in March and April, form a succession of so many fairs, for the sale of sheep, when thousands are sold; as at Tregaron in Cardiganshire, where yearlings and two-year olds are sold every Tuesday, from the beginning of March to the end of April; and every Tuesday, from thence to the end of May, couples (ewes and lambs) fill the market.

Great markets, as they are called, the next before, and the next after, Christmas, have the appearance of small fairs for the sale of live stock.

The market-towns in each county have been already enumerated, in the first Chapter, on the divisions of the district. The towns which have two markets, or more, a week, are Haverfordwest, Tenby, Milford, Caermarthen, Cardiff, Swansea, Merthyr Tudful, Neath, Aberystwyth, and Brecon. In the latter, the week is nearly occupied in marketings: Tuesday, for fat sheep, bacon, or pork, &c.; Wednesday, corn, butter, cheese, butchers-meat; Friday, store sheep, hogs, &c.; Saturday, the same as Wednesday. Cardiff and Cowbridge are among the earliest markets we have noticed: the butter market is from seven to nine o'clock; corn

from twelve to two; and butchers-meat from nine to three; so that some of the most sober farmers, &c. may be at home betimes to dinner.

Caermarthen has a fish-market every day in the week, excepting Sunday.

SECT. V.—COMMERCE.

THE commerce of the slate and shale tract consists in exports of great numbers of cattle and sheep, hogs and horses, for England; articles of the dairy for the English counties on the borders, Bristol, and the iron-works, &c. of the coal tract; great quantities of wool for the northern manufactories, and other places; leather for Bristol, &c.; lead ore from the counties of Cardigan and Caermarthen; black-jack or sulphate of zinc from Cardiganshire; argillaceous roofing slates from the counties of Cardigan and Pembroke; timber and bark, in less quantities than heretofore; corn, in years of plenty; with imports of wheat, barley, and malt, into the less fertile parts.

The commerce of the red sandstone tract is similar, though to a less amount: it has no minerals hitherto discovered.

The commerce of the middle limestone tract consists of live stock in proportion to the smallness of its extent; lime, and limestone; dark-coloured or bituminous marble, spotted with white; tripoli for Bristol.

The commerce of the coal tract consists in great quantities of coal, culm, iron, in pigs, bars, bolts, and castings; manufactured tin plates; copper in its smelted state, or plates, the ore being imported from Cornwall,

Cornwall, Anglesey, &c.; live stock, wool, clay for the potteries, fine brick.

The commerce of the southern limestone tract consists of live stock, wool, corn, dairy produce, leather and hides, limestone and lime for the West of England, Cardiganshire, &c.; Aberthaw lias stone for water cement, varieties of marble, freestone, gypsum, lead ore; and from the sea-coasts, samphire, laver, oysters, turbot, salmon, &c. for Bristol and the interior.

Many of the necessities as well as luxuries of life are imported: groceries mostly from Bristol; mercery from the North and the West of England; ironmongery from Sheffield and Birmingham, &c.; porter from London and Worcester, whilst porter and ale are also exported from the brewery at Swansea. Limestone for exportation is charged by the quarrymen in Gower at from 1*s.* to 14*d.* per ton: limestone is also imported as ballast, close by the exporting lime-rocks, and sold at Swansea, Neath, &c. for from 14*d.* to 28*d.* per ton, according to demand: this limestone, variegated, and apparently magnesian, is brought by the vessels from the coast of Plymouth, which return laden with coals.

The coal tract, owing to its less fertility of soil, and crowded population, makes very considerable drafts upon the neighbouring tracts and sea-ports for articles of provision. It must also be allowed, that it imports lime, were it only half a mile distant, for building, manuring, &c., as well as limestone for fluxing the blast furnaces.

We were exceedingly pleased in seeing one article of importation into the coal tract: these were *cannon*, taken from the enemy at the battle of Trafalgar, and bought by Mr. Taitt of the Dowlas iron-works, to be

broken, re-cast, and forged into horse-shoe iron. This was a grateful sight, and led us into the charitable wish, that all the cannon in the world were in the same state of condemnation, excepting the two lots designed for the two triumphal columns, one at Moscow and the other at Petersburg. *Merthyr Tudful* once exported cannon, in the days of its founder, Mr. Anthony Bacon, during the American war: these cannon, we hope and trust, have been imported to the same place under better auspices. The Merthyr foundry of cannon was transferred, about the close of the Transatlantic contest, to the Caron Company in Scotland.

Naval Commerce.—Though the twin offspring of huge Pumlumon, the Severn and the Wye, rank among the chief of Welsh rivers, yet, as their outlets into the channel are too distant from the limits of our Survey, we shall, using Drayton's words, begin with the commerce of "the *sprightly Usk*," which "from Brecon's fruitful womb doth fetch her high descent."

1. *Newport* is called by the Welsh, *Castell Newydd ar Wysg*, i. e. Newcastle upon Usk. The castle has, however, long been in ruins; and the town wore the aspect of decay, until the commerce of the Monmouthshire and Brecon canals, centering at this port, enlivened the scene, by carrying on a brisk and favoured trade, in coals and iron. The changing of the feudal name of this town, *Newcastle*, into the commercial appellation *Newport*, may be considered auspicious; and as it is likely to continue progressive, it may, in less than half a century, have its name changed again into *Richport*. The tonnage of the Monmouthshire canal alone, before the opening of the
Brecon

Brecon canal, amounted to upwards of 44,000 tons in the year. The Welsh Quarterly Meetings of the Iron Masters are held in this town. During the quarter ending 13th October, 1813, 1100 vessels cleared out of this port, of which 963 were coasters, and 137 foreign.

2. *Cardiff* seems to be the last link in the chain of corrupted terms from the original *Caer Dâf*, (*Castrum super Tawum*) which progressively became *Caer Dyf*, and now in Welsh, *Caer Dydd*. The river Tawe was Normanized into Taff, whence Llandaff, and probably *Caer Daff*, now Cardiff. Some derive the present Welsh name, *Caer Dydd*, from the Roman Governor, Aulus *Didius*. The three rivers, Romney, Taff, and Elai, here approaching to a confluence, contributed their joint agency in the formation of the safe and commodious harbour of Penarth, the best on the channel, excepting Milford.

Since the establishment of the great iron-works at Merthyr Tudful and its vicinity, this port has very considerable traffic, secured to it by being situate at the outlet of the Merthyr and Aber Dâr canals. In 1701, the number of ships belonging to this port, including its subject creeks of Newport, Penmark, and Aberthaw, were 11, and tonnage only 218. Now the times are very much changed indeed; but how much, we dare not venture to say: but this is evident, that the tonnage of the year 1701, is scarcely equal to one-fourth of the average weekly produce of iron from Merthyr Tudful alone. At times, the wharfs at Cardiff may figuratively be said to groan under the accumulated loads of bar-iron, &c. there lying in wait for

COMMERCE.

The revival of commerce speedily
circumstances.

Accordingly, we find little trading along
the coast. It has limestone from Aberthaw, or
exported for the burning of lime, &c. until we
reach Aber-Avon Bar, where ores of copper are
imported from Cornwall, Ireland, &c. and copper
boilers, &c. are exported from the Margam works.

Neath exports vast quantities of coal and culm;
iron, copper, tin plates, fire bricks, &c.

The trade of Swansea in 1701 was very incon-
siderable; including the subject creeks of Neath,
Swansea, and South Burry, the ships were only 37,
of the tonnage 1468: in the year 1768, the vessels en-
tered Swansea alone were 694, and the registered
tonnage 30,631: and in 1793, the vessels entered were
of the tonnage 120,822; and since the opening of
canals to more distant collieries, even to Brecknock

5. From the *Burry River*, *Lloughor*, *Machynys*, *Llanelly*, and *Kydwelli*, much coal and culm is exported: iron; copper ore is imported, and the metal exported. Much activity and speculation have been displayed of late, towards rendering the several harbours on this line of coast more safe and commodious.

6. The commerce of *Caermarthen*, on the *Towy*; and of *Llaugharne*, on the *Tawe*, consist in exporting the produce of their respective districts; and in importing shop goods and other necessities. Vessels of great burden may come up to *Llaugharne*, and of 100 tons and upwards to *St. Clare's*; and the *Tawe* might be rendered navigable for eight or ten miles higher into the country.

At *Sander's Foot*, much stone, coal, and culm, are exported in the summer season.

7. *Tenby*, with *Haverfordwest*, according to the regulations of the Custom-house, are creeks subject to the port of *Pembroke*; the joint number of shipping in 1701, was 4; and tonnage 97. *Haverfordwest*, being better situated, near the centre of the county, monopolizes most of the commerce.

8. *Milford*—"How came Wales to be blessed with such a Haven?"—*Shakespear*.

"*Milford* is an infant *Hercules*."—*Dundas on Commerce*.

This Haven is remarkable for being connected with military and revolutionary events in English History: from hence, both a King of England, and an Usurper, set sail for the reduction of Ireland: here a King of England landed from Ireland to be dethroned; and

here a proscribed Prince landed from France to be crowned King. Some of these events may have given rise to varieties of superstitious predictions, during the dark ages, that here would land a personage of a certain hieroglyphic description, either as a friend to deliver, or a foe to dread, just as it suited the state of the times, and the policy of the fabricator. This credulity was not entirely extinct among the lower class, even so late as the American war. Now they are deservedly forgotten, and *Rhobin Ddu* is permitted to sleep in peace.

The position of Milford, and the advantages it offered to its possessors, made it generally a subject of speculation, whenever any dread of invasion was afloat. When the Spanish visit was expected in the reign of Elizabeth, an engineer of the name of *Ivy*, was sent down by Government to survey the Haven, and give in his Report of the necessary means of defence. The engineer's conduct at the time, caused much discontent in Pembrokeshire, as appears by a spirited memorial transmitted to four of the leading Members of the Privy Council, severally, to the Lord Keeper, the Lord Treasurer, the Earl of Essex, and the Lord Buckhurst; with a copy to the Earl of Pembrokeshire, and signed by the Bishop of St. David's*, and John Wogan, George Owen, Francis Meyrick, and G. Alban Stepneth, Esquires, and Magistrates for the county; wherein they set forth the great consequence, to her Majesty and the realm, that the Haven of Milford should be properly and effectually fortified; that some engineer of experience should be sent down

* Dr. Anthony Rudd.

for the purpose, and, in short, that "*Mr. Pawle Ivey*" had not given satisfaction to the memorialists*.

In consequence either of the Survey by Ivy, or of the correspondence which took place between the Magistrates of Pembrokeshire and the Lords of the Privy Council, orders were given for the erection of two forts, which were begun, but never finished; one is called the *Nangle* Block-house, on the south-eastern, and the other called the *Dale* Block-house, on the north-western side of the Haven's mouth. These spots have been represented as very ill chosen, as they were calculated for the annoyance of friends as well as foes. The *Stack Rock*, always above water, and situate about midway between Nangle and Dale, and the *Sandy Haven* Point, are said to be much more advantageous positions for forts.

When the dread of the Spanish invasion subsided, Milford Haven remained neglected; which drew forth the following observations from Mr. John Lewis, (the annotator on G. O.'s Hist. Pembr.) in the reign of Queen Anne:—

"The consequence of Milford Haven to the realm, doth not seem to have been sufficiently considered, otherwise more would be done for its defence and improvement; for I have been informed by an experienced officer, grown grey in the service of his country, that in case of Ireland being ever invaded and dismembered, it would be impossible for the enemy

* See the Memorial, in full, in the *Cambrian Register* for 1796, from the copy of Geo. Owen, Esq., one of the memorialists, and the Historian of Pembrokeshire; and also in *Garth's Topogr. Dict. of Wales*, v. *Milford*, from the identical copy sent at the time to the Lord Treasurer Burleigh.

long to hold it without securing Milford, which would be their great aim; so that it behoves Government to take every step to prevent its falling into their hands in such event. And it likewise was his opinion, if ever they should attempt it, they would begin by a descent on the coast of Cardigan or Newport, to throw the country into alarm, that so the Haven might be left defenceless, and an easier prey."—1700.

A well written Pamphlet, entitled, "*Proposals for enriching the Principality of Wales, humbly submitted to the consideration of his Countrymen, by Giraldus Cambrensis*,"—was published in the year 1755, followed by a second edition in 1762: among other means recommended by this intelligent writer, is the *Victualling of the Navy at Milford*. However, we do not find that any materials were expended, excepting ink and paper, for the improvement of Milford, till about the commencement of the American war, when Government had it in contemplation to erect a Dock-yard at Nayland, a small distance to the east of the present town of Milford; and some lands in its vicinity were purchased, for the erection of forts and batteries for its defence: but when one of the fortifications was carried to a considerable extent, the whole was abandoned as an untenable spot, in case of attack, after expending, as some say, 20,000*l.* before that discovery was made: only two ships, the *Prince of Wales* of 74 guns, and the *Milford* frigate, were ever built there, and both of them by contract.

In the year 1790 an Act passed, empowering Sir William Hamilton, his heirs and assigns, to set out Legal Quays, establish Markets, make Docks, &c.; which laid the foundation of the present town of Milford.

The

The improvements, under this Act, were put in execution under the direction of the Hon. R. F. Greville, the present proprietor. A new town started up in a few years, so as now to consist of about 160 houses, in three principal streets, running parallel with the Haven, from east to west, with others crossing at right angles. Some of the buildings are elegant structures: it is a pity, however, to observe in them a bad selection of the Nolton freestone, as the surface is already mouldering. The true Nolton stone, selected from the proper strata, is durable; and resembles the Forest of Dean stone, though of a finer grain. The situation of the town is pleasant, on a dry elevation, and in a healthy air. Among the new edifices are, an elegant chapel, built and endowed by Mr. Greville; a custom-house, storehouses, two quays, &c. Several ships of war have been built here; the Milford of 74 guns, the Lavinia frigate of 40 guns, and the Nautilus sloop of 30 guns, were undertaken by a London contractor, who failed, and the completion of them fell upon Government. The Milford was launched in 1809.

Commerce commenced its career at this infant settlement, with ships engaged in the Southern Whale Fishery, belonging to a company of American settlers from Nantucket. The mail from London arrives here daily, and on its arrival a packet sails daily for Ireland. Two markets in the week have been established here.

What further progress commerce may make here, lies concealed in the womb of time: the prospect however, in the summer and autumn of 1813, was favourable: the New Royal Dock-yard, and Naval Arsenal were to be established at Milford. We shall here sub-join

join the information of a sanguine and intelligent writer on the subject :

“ The Government, after years of deliberation, and with all the circumspection that such an important subject demands, has finally determined upon the situation of the New Royal Dock-yard and Naval Arsenal. For this valuable prize, Milford has had many competitors : Northfleet, Southampton, Falmouth, and Scilly, have each engaged the public attention ; the claims of each have had their advocates, of no mean powers, in the Senate, and in the Cabinet. *Milford's* highest praise is, that she had none of them : her unparalleled advantages have spoken with the still small voice of Truth ; and she has been heard across the kingdom. To be heard was to be victorious ! The Judges have awarded her the prize.

“ The present intercourse between Milford and Hakin is inconvenient, frequently interrupted, and in the night always dangerous. A bridge would at once remove all difficulties, and be productive of a large income ; which may be estimated nearly by the result of the following experiment :—In the week ending the 19th of October last, in which there were no fairs or public meetings, and much unfavourable weather, it was ascertained, by persons stationed to observe, that 1400 persons, upon an average, crossed the creek each day : on one of the days no less a number than 1994 persons passed before nine o'clock in the evening. The abutments of this bridge will be made to dam up a sheet of water of more than 60 acres, into which two streams run, and which will fill each tide from the Haven. Mills upon the most approved principles, with this never-failing supply of water, will here be profitable. The sides of these abutments will be constructed so as to form

form graving docks, into which the vessels will float: by these means the danger, interruption, and loss of time and materials in repairing on the rocky beach, will be entirely avoided; and from the consideration that more than 63,000 tons of injured shipping took refuge in the port of Milford during the seven years ending the 1st of January 1813, no doubt can for a moment be entertained of the great annual value of graving docks.

“ The great area of water thus dam'd up, will form one of the largest floating docks in the Empire—in an unrivalled situation as a depôt for goods *in transitu*; at present of great importance, but in the event of Milford being made a bonded port, of incalculable value. This dock offers an asylum during the winter months to the great number of vessels which are now compelled to lay up on the beach for many leagues, north and south of the Haven, exposed to tempestuous winds and seas: here they will be received, and guaranteed from all possible damage or loss, constantly afloat and perfectly secure.

“ *Statement of the probable Income and Expenditure arising from the intended Improvements.*

“ <i>Income</i> per annum, from the bridge,	} £11,377
· mills, graving docks, timber ditto,	
wharf and sheds, vessels lodged during the winter months in the floating	
dock, vessels passing the lock, and laying afloat to discharge, reship, and	
repair, &c.	

“ *Expendi-*

COMMERCE.

penditure per annum, interest of	}	£9750
000l., the estimated expense of the		
ks, &c. at 15 per cent., Officers and		
stants, rent, repairs, taxes, station-		
&c.		

Signed 1st of Nov. 1813,

"T. STEDMAN WHITWELL, Civ. Engineer."

complete these projected improvements a sub-
on was set on foot, to raise a fund of 45,000l. in
of 100l. each; and a Petition was presented to
ouse of Commons, in November 1813, for leave
g in a Bill to that effect. What was the fate
Petition we do not know: but whatever was,
be, the present issue, Milford Haven must,
or later, receive the attention its unparalleled
advantages so eminently and evidently merit.

"Ceir yn hwyr gan eu hwyrion,

Exclusive of Roads, Bays, and Creeks, are the following main Pills :

- | | |
|--------------------------|---|
| 1. Pennar Mouth Pill, | } all on the southern side of
the Haven. |
| 2. Coshaston Pill, | |
| 3. Carew Pill, | |
| 4. Creswell Pill, | |

1. Pennar Mouth Pill, is that which extends up to the town of Pembroke. The entrance or strait, between rock and rock, is only 200 yards at high water, and 112 at low water, and from 9 to 12 feet deep: which soon expands into a wide estuary, wherein, according to Mr. Lewis Morris, a dock might be made, capable of containing all the vessels in England. Here are inexhaustible beds of oysters, of superior excellence; being those described by G. O. in the Section on provisions, under the appellation of Crowe Oysters; the expanse of water being called Crow Pool.

Several Reports have been given of the capaciousness of Milford Haven. One says that it will contain with ease more than all the navies in Europe. In the present state of foreign navies it may. We will content ourselves with the report of a Naval Officer on the spot; who asserted, "that it could contain at once 1000 ships of the line, 1000 fifty gun ships, 1000 frigates, 1000 sloops of war, and 1000 transports to supply them; without one of them being ever in the way of the other, or in the least incommoding one another: and that 100 sail of the line could be brought to act all at once on any ship or number of ships, that might attempt the Haven."

9. Proceeding still westward, we arrive at the spacious *Bay of St. Bride's*; where small craft, in several

COMMERCE.

al little creeks, are occupied in the coal, culm, limestone trade.

On the western curve of this Bay, to the north of coal tract, lies Solva, "lately," says Mr. Mal-
"as poor a village as any in this poor country;"
within about 24 years, a new, neat, and com-
pious town has sprung up, much to the credit of
persons concerned in it. The inhabitants are in-
rious and thriving. About 30 vessels of different
ensions, from 20 to 250 tons burden, belong to it.

larger vessels engage wherever they can get
ht: the smaller craft take a few cargoes of corn
inter to Bristol, and return with limestone and
a from Milford, for the use of the neighbourhood.
his romantic little harbour, according to Mr. L.
ris, were it improved, would be useful for vessels
en into Bride's Bay by stress of weather; but in
resent state, it is next to an impossibility for a
nger to find out the entrance. 'Tis a pity that his

according to the distance from the shore, which is bold nearly all around. The quality of the bottom all over the bay, is sand, mixed with mud a little below the surface, which anchors well. Ships of the largest size may anchor in all parts of it with S.E. S. and W. winds, in perfect safety. The road, in general, may contain above 100 sail of vessels, large and small, sheltered from all winds except N.N.W. to N. E.

“The Harbour of Fishguard is of an irregular form, but capacious, and easy of access, having neither rock nor bar at its entry, which is about 1160 feet wide, and in length about 2400; but it is greatly in want of a proper pier. The Irish packets often put in here, when driven by stress of weather. Near this port, about 1100 Frenchmen, under Gen. Tate, landed in 1797; who in about two days surrendered themselves prisoners to the “Thane of Cawdor.”

Mr. Spence, the engineer, being sent by the Board of Admiralty to survey the Bay and Harbour of Fishguard, about the year 1791, and to make an estimate of the expense of building a pier there, which had been suggested as a means of ensuring considerable protection to the trade of the Irish Channel, and much approved of, particularly by the Dublin and Liverpool merchants, and the masters of the Milford packets; strengthens his Report of the great necessity of a pier at Fishguard, by the following observation:—
“I am well informed, that all the vessels, to the amount of 17, which have been lost on this coast within these 20 years, might have been saved, had there been a proper pier at Fishguard to receive and shelter them.”

He continues—“From an attentive view of this harbour, and its vicinity to the road, it would seem as

if Nature had designed it as an asylum to ships in distress there; but points out the necessity of a pier, which would render Fishguard a safe and commodious harbour for the largest ships which now use the Irish Channel." But still, from 1791 to 1814, Fishguard is without a pier; and 17 sail of ships more may have been lost for want of it: but the last 20 years was a period of war, in which it could not well be expected: five years peace may do, in this respect, what twenty years war could not.

Mr. Spence's estimate amounted to 14,785*l.* 18*s.* 5*d.*

"The want of such an improvement to Fishguard, (says Mr. Fenton), greatly restricts the number of its shipping as well as tonnage: yet there are at present belonging to it from 23 to 30 vessels of 20 to 50 tons; and 25 from 50, to 100 and 110 tons; besides several on the stocks. The principal exports are oats, and butter, and slates from the neighbouring quarries: the imports are shop goods from Bristol, coal, culm, limestone, and timber. The neighbourhood supplies about 36,000 bushels of oats, and about 74,000 lbs. of butter for exportation. The smaller vessels are engaged in the home trade; and the larger ships take freight wherever they can get it, between Bristol, Milford, London, Ireland, &c."

From hence, northward, most of the harbours are considerably obstructed by bars of sand.

11. Newport (*Trecodraeth*) has a small *bar* Harbour, for a few coasting vessels and fishing boats. On the bay, slates are quarried from the overhanging cliff, and let down into the vessels. Mr. Morris, in his survey of the coasts, mentions a vein of alum earth near this place, which has never been worked.

12. *Cardi-*

12. *Cardigan*, in the arrangement of the Custom-house, is the mother-port, to which the daughter-creek of Fishguard is subject. The mouth of the Teivy is, however, choaked with a bar, having from 10½ to 11 feet on neap, and from 15 to 16 at high water, ordinary spring tides. A buoy and perch on this bar were lately presented to the port by Col. Vaughan, M. P. Vessels of 200 tons, or more, sail up the river, two miles, to Cardigan Bridge.

13. *Aber Porth* has a few coasting vessels, exporting barley, oats, butter, &c. to Bristol, Liverpool, Neath, &c.; and importing culm and limestone for the use of the neighbourhood. "Two leagues east from Cardigan Isle (says Mr. Morris) lies *Cribach-road*, which was much frequented by the French in former wars, and shews how well that nation was acquainted with our coast. It is a snug road, and a pier might be made at a little expense."

14. *New Quay* has an excellently well-sheltered road for shipping, with a small pier almost in ruins, being merely formed of stakes driven into the sand, and stones placed around them. It has a good outlet; and, like most other places on Cardigan Bay, it was formerly much frequented by smugglers. According to Mr. Morris, a perch is much wanted at the extreme of that patch of foul ground called *Carreg Ina*, which would render it a safe road for large shipping. We have noticed this harbour as a candidate for being the station of the Irish packets, in the foregoing Section on *Roads*.

15. *Aber Aeron* has a pleasant small port, at the
ff 2 fall

fall of the Aeron into the Bay of Cardigan. The bar is dry at low water. The Rev. A. T. G. Gwynne, caused lately two piers to be erected here, one on each side of the mouth of the Aeron, with the conveniences of a wharf, cranes, and storehouse, at the expense of about 6000*l.*; by the which the port has been much improved. Mr. Morris recommended a buoy at the extreme end of Sarn Cadwgan, to direct strangers when driven in by stress of weather. The spring equinoctial tides of 1813, did considerable damage to Mr. Gwynne's improvements at this port.

16. *Aber Arth* lies contiguous to Aber Aeron, and is similarly circumstanced, in having a dry bar at low water, and in carrying on the coasting trade, in exporting corn and butter, and importing culm and limestone.

17. *Aber Ystwyth*, is so called from the fall of the Ystwyth into Rheidiol. Subsequent to the imposition of the name, the two rivers became divided by the operations of floods, and entered Cardigan Bay at separate mouths. Of late years the two streams have been again united by a cut made for the purpose; in order that the land-floods of both united might have greater effect in keeping open the mouth of the harbour, which, nevertheless, being so much exposed to S.W. winds, is much choked by sand. This prevents ships of any considerable burden from entering, excepting in spring tides, when the bar has about 14 feet of water. This place, from its situation, and the thriftiness of a considerable population, is capable of carrying on a very extensive trade, had it been favoured with an unobstructed harbour. Its present commerce consists

consists in exports of lead ore, black jack, oak timber, poles for the Pembrokehire collieries, bark, oats, butter, &c.: its imports are limestone, coal, culm, foreign deals, shop-goods, &c. "In 1701, there was but one vessel, of 14 tons, at this port."—*Mr. Chalmers.*

At the Wig (*Wick*) on the north side of the town, according to Mr. Morris, "a capital harbour might be made, by running a pier out on the ridge of rocks, which might be effected at the expense of about 20,000*l.* This would then be the best situation on the coast of Wales, for the station of packets between England and Ireland."

* We have already enumerated *three* ports in South Wales, that are rival candidates for the stationship of the Hibernian packets: then, this Wig, near Aber Ystwyth, is the *fourth*. If ever a general election takes place on the subject, and the shortest route to a convenient sea port be considered an advantage, the port of Aber Ystwyth is represented as being only 202½ miles from London: its situation is also central between the two established packet stations of Milford in South Wales, and Holy Head in North Wales.

We shall conclude this Section on Commerce, with a quotation from a political writer of celebrity; and beg leave to recommend the application of it to our countrymen: "*The ground of Trade cannot be deduced from havens, or native commodities; but from the number, industry, and parsimony of the Inhabitants.*"—Sir W. Temple, on the United Provinces.

SECT. VI.—MANUFACTURES.

1. *WOOLLEN*.—Necessity, in every country, has been the mother of invention. The inhabitants of cold climates required warm clothing: and wool, spun into yarn, and manufactured into flannels and cloths, were comfortable substitutes for the skins of various animals.

In South Wales, we have no account that the manufacture of woollens exceeded the demand of home supply, till the Pembrokeshire colony of Flemings established a cloth manufactory at Tenby, who, according to Mr. Fenton, carried on a trade in woollen cloths with foreign parts. The Norman settlers in the northern part of Pembrokeshire, are also said by the same writer, to have carried on an extensive woollen manufactory at Newport; both places having the advantage of convenient harbours. When this trade was discontinued at Tenby, is not perhaps well known: at Newport, the failure is attributed to an epidemic malady, perhaps the sweating sickness, which almost depopulated the town. At this time, Newport market, founded by a deed of Nicholas Martin, Lord of Kemmaes, in the sixth year of Edw. I. was transferred to Fishguard; which market then rose upon the ruins of the other. Of late years, the reviving trade of Newport occasioned the resumption of its chartered market; changing the day from Thursday to Friday.

About the beginning of the 17th century, there was a considerable manufactory of woollen cloths in the town of Brecon, and the neighbourhood. It had however, much decayed in the middle of the last century;
for

for in September 1755, the Agricultural Society, then newly instituted, offered a premium for the best piece of drab-coloured cloth, manufactured in the county; and other premiums for the best woollen yarn, offered on sale in Brecon market: and the reasons given in the Memoirs of the Society for offering these premiums, are, "the encouragement of domestic industry; and the prevention of exporting all the raw wool out of the county." The first yarn market was held on the 9th of June, 1756. The patriotism of the Society, however, in this respect, produced no lasting effect: it continued then in a lingering decline till about the year 1780, and expired: the Society thenceforward limiting its premiums solely to the various branches of agriculture.

In a few years afterwards carding and spinning machineries were gradually introduced into the six counties: their extension and utility, however, have received a temporary check by the effect of the war.

In Radnorshire, an attempt was made, some years ago, to establish a flannel manufactory upon a large scale at Presteigne; but, in consequence of the loss which almost always attends infant establishments of the like nature, it was, perhaps prematurely, given up. Others, upon a more limited scale, have been since erected; one at Maestreyloe, three miles west of Presteigne; another, in the upper end of the county, at Rhaiadr, where flannels of from 2s. to 3s. a yard are finished for sale.

In Brecknockshire, a flannel manufactory has been established, several years ago, at the Hay.

In Glamorganshire, machineries of this kind are pretty numerous. A woollen manufactory was established at Caerphili some years ago: yard-wide cloths, of various colours, are here finished, and sell accord-

ing to quality, from 5s. to 9s. per yard. Another additional building, with a fulling mill, were erected by the same company, in 1803; where fine broad-cloths, of 20s. per yard, and upwards, have been finished, from the fine wool of the flocks on a neighbouring Down, called Eglwys llan Down.

Other manufactories have been established at Cardiff, Merthyr Tudful, Bettws Llangynwyd, Tonn Drygwal, near Llantrisant, &c.

On Penarth Pill, in the parish of Ilston, in Gower, seven miles west from Swansen, a cloth manufactory has within these few years been erected by Mr. Grant, from Scotland; which is carried on with the same spirit as commonly dignifies that nation.

But the manufactory upon the largest scale, was that erected by the patriotic combination of the Gentlemen of the County; to encourage industry among the inhabitants, and to provide a home market for the wool. A large fabric was built for the purpose, on the Ogmore river, noted for the softness of its water, near the plentiful market of Bridge End, and within a short distance of a cheap colliery at Bryn Cethin. The machineries were complete, on the principle of the most approved construction. For several years, from 60 to 100 hands were employed under the superintendence of Mr. Dare, who had been initiated into the minutiae of the profession in the West of England. The long wool of the Vale, Leicester, and Costwold sheep, was here combed, spun, woven, dyed, and finished into coating, swansdown, serge, and plush, of from 10s. to 16s. a yard. The short wool, Spanish, Ryland, and the limestone downs sheep of the county, was manufactured into narrow and broad cloths, plain and kersey. Some excellent stuffs were made

made by using the worsted of the combing wool as warp, and the short wool for woof.

The gentlemen proprietors at length grew tired of the repeated *minus* balance, and gave up the concern, for the present at least, to Mr. Dare, who has confined the manufacture to a fewer articles; and among others, to *scarlet shawls* of high prices, in imitation of the provincial dress called the *Gower Whittle*; and which have now become winter garbs of much request with the ladies. Whether the proprietors intend resuming the manufacture at the return of better times, we do not know: and of what could be the cause of the failure of the concern, we must be equally ignorant. However, might not the error lie, in engaging at once in too multifarious branches of manufacture? but the county produces two kinds of wool in good abundance, combing and clothing; and the gentlemen may have wished to encourage equally the growers of both kinds.

Carding machines have, for some years back, become pretty general in the district; and are found convenient in expediting the *domestic manufactures* of the country; consisting of cloths, flannels, blankets, hosiery, linseys of flaxen warp and woollen woof, or cotton woof, or a mixture of woollen and cotton woof, &c. &c. for home use.

In the mountainous parts of each county, women are industriously employed in knitting stockings; many of them coarse, which are brought to fairs, and bought for the use of the inferior military, &c. The Caermarthenshire Agricultural Society, whilst it lasted, encouraged both spinning and knitting by premiums, as employments congenial with the disposition of the female inhabitants. The domestic manufactures of
flannels

flannels and stockings are now annually promoted by numerous premiums dispensed by the Cardiganshire Agricultural Society; and it must be allowed, that in this respect Cardigan is the most active county in Wales. Several genteel families of late used neither cloth nor flannel but what had been manufactured in their own houses; excepting that part of the manufacture which belonged to the tucker, dyer, and dresser; which are occupations well understood in the country.

Mr. Clark seems indignant at the low value of the articles of manufacture in the upper part of the county of Brecon.

“The only branch of manufactory carried on in this place is the working of stockings. These are sold at the markets around, at 8*d.* a pair*. A woman, with very close application, may *card, spin, and knit*, four pair of these in a week; one pair of those stockings weighs near half a pound, which at 10*d.* a pound, is 5*d.* out of the 8*d.*: some pairs, however, weigh only 7 ounces, but as there is 1*d.* of oil requisite for every pound of wool, we may fairly state the raw materials of each pair of stockings to be worth 5*d.*; hence the woman has only 3*d.* for carding, spinning and knitting, a pair of these stockings, or 1*s.* a week. Hence the woman has to support herself in food, raiment, fuel, and house rent, for seven days upon this 1*s.*; yet, at some times of the year, it will buy her only *one gallon of wheat*. Such is the employment, and such the only means of subsistence within the reach of the poorer sort of females all over this extensive tract, although these are as remarkable for industry, as the

* The price has since advanced; and the labour expedited by the introduction of carding machines.—1814.

males are for an aversion to labour. What a pity that this spirit of industry could not be directed to some channel more beneficial to themselves, and the community at large, than this pitiful and ill-judged employment.

“The extensive mountains in which this tract abounds, are covered with innumerable flocks of sheep, the manufactory of whose fleeces into woollen cloths, would furnish employment for more than double the number of the present inhabitants. Yet, wonderful as it must seem, the wool is almost wholly purchased by dealers in that article, as soon as it is separated from the sheep, who send it, some one, some two hundred miles to be manufactured: there it furnishes the necessities—the comforts—of life, to thousands of our more deserving, more industrious, fellow subjects; while the natives of the mountains where the wool grew, are either idle, or manufacturing the refuse of it into stockings, in the pitiful way just mentioned. To complete our humiliation, part of the wool thus manufactured into cloth, is sent back for our consumption, the said 200 miles again. When we thus pay 10s. for that quantity of wool for which we receive but 1s.; and, looking around us, contemplate the wretched state of our own poor, let us wrap the fine garment around us with what *comfort* and *pride* we can.

“This is a calamity which the poor cannot of themselves remove, and which the wealthy do not feel. But the present genius of the times may alter. Who knows but that some one of these sequestered valleys may yet produce a patriot; who, throwing aside the stiff embroidered tinsels, and frivolous trappings of state, which too often surround high stations; and calling to his dejected countrymen to lay aside their sloth

sloth and indolence, prevail on them to follow the path that leads to comfort, to wealth, and independence."—*Orig. Report*, p. 45, 1794.

Wool sold off, to be manufactured in other parts, must unavoidably be the case, in most counties, for ever: for on a large scale, the only profitable scale, manufactories cannot possibly be every where established. However, *domestic woollen manufacture*, on the Cardiganshire plan, expedited by carding machines, situate at convenient distances from each other, with spinning-jennies in the farmers' and cottagers' houses, we could wish to see pervading every part of Wales capable of adopting it. Such *domestic manufacture* might supply the home consumption in every article made from the native wool; besides considerable quantities of flannels, stockings, &c. for exportation. The effects of domestic manufactures, thus spread over the country, would be the reverse of those attendant on, or proceeding from, large establishments, with respect to the more minute and equal distribution of profit, the more general diffusion of consequent happiness, less depravation of national as well as moral character among the labouring class; and, finally, less accumulation of poverty and the parochial rates.

2. *Leather*.—Hides and skins are tanned and dressed in great quantities, for the Brecon, Bristol, and other English markets.

The Glamorgan Vale cattle have the thinnest hides of any known; being excellently adapted for coach and cart-harness: the ox-hides are scarcely thicker than the Hereford calf-skins. Before the operation of the war on foreign trade, hides were imported from
Buenos

Buenos Ayres into Bridge End, and other places, for sole-leather. Pembrokeshire hides make tolerable sole-leather: the Brecon and Radnor hides, having a cross of the Hereford, still better.

3. *Earthen Ware*.—A pottery of fine ware, upon a large scale, has been established at Swansea, some years back. Setts of service plate, of any description, and of the most fashionable models, are here manufactured and exported.

A fine red-ware pottery is established at Cardiff.

The brown-ware pottery at Ewenny, near Bridge End, is supposed to have continued from the time of the Romans in Britain: this is presumed, from the shape of the vessels being still the same as that of ancient Roman vessels dug up from the ruins of Roman stations, tumuli on the Wiltshire Downs, &c. Were we compelled to give up this point, the antiquity of this pottery is considerable; as it is alluded to in the writings of Welsh Bards beyond three centuries back. About seven kilns are now working; and they supply a great part of South Wales with this kind of ware. It is conveniently situated for fuel; being within about four miles of the Bryn Cethin colliery. The clay is on the spot, occupying a tract (near the junction of the white limestone and the isolated grey lias limestone of Bridge End and Lallaston) of about three-quarters of a mile in length, and half a mile in breadth; from 10 to 14 feet deep, and lying upon a substratum of reddish sand.

Other places producing potter's clay, are—1. On Mr. Price's estate near Caerphili, worked for the Cardiff pottery. 2. At Cefn-Cribwr near Pyle, conveyed by sea to the Swansea pottery. 3. A vein of excellent clay,

clay, in limestone, near Flimston in Castle Martin, Pembrokeshire. 4. On Rhos Goch, near Pain's Castle, in Radnorshire.

Fire clay, in beds or veins of various thickness, pervades the greater part of the coal tract; and is manufactured into fire-brick for the use of the iron-works, &c. An accumulated vein of this kind of clay has been discovered in limestone, among the confusion of strata in Dinas rock, in Penderyn, Brecknockshire. The vein is near 20 feet deep, of the most excellent quality, and is conveyed by a rail-way to the head of the Neath canal; and thereby to the fire-brick manufactory at Melin Court; and from Swansea to the coasts of Devon and Cornwall.

4. *Roofing Slates.*—The best blue argillaceous schist for this purpose, is said to be that at Ynys Hir, near Cors Vochno, in Cardiganshire. Quarries of this fossil frequently occur on the sea-coast of the slate tract, from the Dovey on the north to the Gwain at Fishguard on the south. The interior of the slate tract affords workable quarries; but owing to the state of the roads, and the expense of land carriage, there is no prospect of their being opened to any extent: indeed the quantity and quality of the Caernarvonshire slates will not admit of competition. Caermarthenshire has several quarries in the dingles or valleys north-west of the Towy, for home use. Much slate is quarried at Kilgeran, and shipped down the Teivy. The Glôg quarries, near Llanvernach, Pembrokeshire, are extensive and valuable, and especially were a canal made, or the navigation of the Tave extended, so as to convey the slates to the shipping at St. Clare's or Laugharne.

Other

Other roofing slates, for home use, are manufactured from the *micaceous schist* of the red sandstone and coal tracts.

These tracts, and the blue or flag lias tract in the eastern part of the Vale of Glamorgan, also afford flooring and tomb-stones.

Other fossils for manufacture, are—*grind-stones* and *scythe hones*, at Llan Gwydd, Coety, Pyle, Caer Bal, Landough, St. Hilary, Gelli Garn, &c. in Glamorgan, millstones at Merthyr, Twynau Gwynion, Rhos Sulwy, Pen y Vai, Caerphili, Cefn y Bryn, Newton Down, &c. in Glamorgan, and in the coal tract in the other several counties. *Slate pencils*, a marlite, in many places in Gower, said to be equal to those of Nuremburg.

Marbles, for chimney pieces, &c. have been already treated, in the Section on *Building Materials*.

5. *Miscellaneous Articles*.—The only Establishment for the manufacture of *cotton*, within the district, was that erected upon the Cleddeu near Haverfordwest, about the year 1786; it continued working about 16 years, and gave employment to about 150 persons: the return of peace may put its machineries again in repair and motion.

Hemp and *flax*, when trade is under no prohibition, are imported, and manufactured into cloths for home use. Crofts for the cultivation of hemp and flax, are now becoming more frequent, in parts where the soil is appropriate.

Brown paper is made at a manufactory near Haverfordwest; and at Glan Grwyney, near Crickhowell in Brecknockshire. Neither of these stand upon streams issuing from limestone; the water of which is said to excel

MANUFACTURES.

in decomposing rags, and in rendering paper
hereby of a softer and finer texture.

Metallic Manufactures.—I. Iron.

Antient Bloomeries.—On the surface of the mineral
are frequently found heaps of *scoria*, more or
reduced, and some of them with an accumulation
on their surfaces, whereon stand decayed and
oaks, &c. In some parts of the island, these
are attributed to the Phœnicians, in others to
Danes, because they are vulgarly called “Danish
heaps.” Here they are termed by the English “Rounders:” and in Glamorganshire and Monmouth-
the scite of such a hearth is called “*Y Varteg*”

Welsh: without the article *y* (the) the term
be *Marteg*, which seems to be of Roman ori-
from *marie*, the abl. of *maris*. Mr. Frere, pro-
of the Llanelly iron-works, in Brecknockshire,

bable that in early days a farmer or two and their servants, assisted perhaps by some itinerant of this branch of metallurgy, set up their rude and inartificial iron-work, and made, as occasion required, a few pieces of iron for their own and their neighbours' use: when more iron was wanted, some other spot was thought more convenient for obtaining the fuel or ore, and the apparatus was at most a hammer, an anvil, and perhaps a pair or two of portable bellows; though probably the wind alone, directed by screens, or some contrivance similar to that found in use in Peru, a long ditch cut up the slope of a hill and covered with stones, turf and earth, forming a kind of reclining chimney, gave the requisite intensity to the fire; and such an establishment was as easily set up in a fresh place as on the old spot, for wherever the materials were at hand, the work might be carried on immediately. Here it may be remarked, that as the charcoal was much the most unwieldy as well as the most perishable requisite for the operation, the ore was certainly carried to the charcoal rather than the fuel to the ore. These spots, therefore, many of which are now not within a mile of a bush, were at that time contiguous to, if not covered with wood: beyond this, there is little in these relics worth notice, except as shewing the imperfect state of the art, by which so large a portion of metal was left in the scoria; and the very low state, or rather total want, of commercial intercourse in those days; for when a farmer found that to quit his daily employment and turn metallurgist was an *easy*, it must certainly have been the *only* mode of procuring the iron he wanted.

“ In more civilized or less turbulent times, when internal communications were more safe, and a degree

MANUFACTURES.

mercantile confidence was established; and when as well as other articles could be sold, it then became worth while to individuals to set up the manufacture as a distinct trade, and to become iron-masters.

Observation and experience suggested, both in process and in the machinery for carrying it on, improvements totally incompatible with the old anachronistic state of the art; and the attention of the men, in larger and more permanent establishments, considerably abridged manual labour, and rendered the process more frugal as well as more complete.

In the progress of these improvements the charcoal-furnace, with the finery for rendering the produce of the blast-furnace malleable, were introduced; and for 200 years bloomeries have been totally disused in this country, though they still continue in Spain.

Among the improvements of the last, and it may be said of the present century, (for there are daily improvements), those in the manufacture of this most

* From 1711, to 1713.

In 1807.

	£	s.	d.		£	s.	d.		
A bushel of wheat, ..	0	6	0	—	.....	0	12	0	
Ditto, malt,	0	4	0	—	.....	0	13	0	
Bag of coal at the pit,	0	0	2	—	.....	0	0	3½	
A labourer per day,	0	0	6	—	.....	0	2	6	
Ditto in water, clearing mud, &c.	}	0	0	8	—	.....	0	3	6
A mason, not in constant work,	}	0	1	2	—	.....	0	3	6
A mill-wright, head man,	}	0	1	3	—	A man of science, ...	0	4	0
A stock taker, per week, with house and firing,	}	0	7	0	—	Ditto, from 21s. to	1	4	0
A ton of bark, 21 cwt.	1	6	0	—	.....	9s. to	10	0	0
A ton of pig-iron, ...	5	19	0	—	.....	5l. 5s. to	5	10	0
Ditto of bar-iron, ...	16	10	0	—	.....	16	0	0	
Iron by retail, per lb.	0	0	2	—	.....	0	0	2	
Produce of the furnace per week, 20 tons.					—	From 50 to 55 tons.			
Forge-work, per month, 11 tons,					—	.....	40		
Rent of coals and mines, per year,	20	0	0	—	.....	2000	0	0	

* From these data it appears, that while the price of labour and the necessaries of life have been doubled and trebled, and the value or rent of the mines and collieries have been increased one hundred-fold, still, by the various improvements in the manufacture, the price of the produce has been kept at, or under, what it was formerly sold for."—E. F.

In the progress of arts and manufactures, bloomeries became discontinued, and artisans established themselves as iron-masters, in places the most convenient for the requisite materials. The gradual increase of this branch of manufacture, and the want of foresight in protecting woodlands for charcoal, at length brought

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the nation to the brink of a dilemma, either to reduce the iron manufacture, or substitute some other fuel.

In the 12th year of James I. (1615) an iron-master of the name of Dudley published his *Metallum Martis*, wherein it is asserted that there were, at that period, 300 blast furnaces using charcoal fuel. Many attempts were made to substitute coal for wood, and several patents were granted for the exclusive right of manufacturing iron with pit-coal. None however succeeded, till Mr. Dudley, in 1619, manufactured three tons per week per furnace. Troublesome times followed, and the reward that poor Dudley experienced, from an ungrateful and narrow-minded public, was the destruction of his works and machineries. At the restoration of order, in 1663, Dudley applied for another patent, which was refused: at this time, owing to some progress in improvement, he says that he was capable of making seven tons per week of pig-iron, with pit-coal coke.

The increasing scarcity of wood, the inadequacy of the machinery then in use to produce the requisite effect upon pit-coal coke, and the prevailing prejudice against the quality of iron manufactured in the new mode, all contributed to the decline of the iron trade in England and Wales; so that about the year 1750, out of the 300 furnaces mentioned by Dudley, as being in work in the preceding century, there were but 59 furnaces in the whole kingdom; whose annual produce was 17,350 tons, or nearly 300 tons *per* furnace, *per* year, of pig-iron.

The first establishment of the iron manufacture in South Wales, that we heard of, was by the Hanburys. Capel Hanbury, Esq. is said to have come from Worcestershire to settle upon a purchased property at Pont-y Pool,

y Pool, about the year 1565; and to have worked the mines of coal and ironstone, and erected furnaces and the requisite machineries, so as to have iron for sale by the year 1588. One of Mr. Hanbury's descendants established the iron-works on the river Clydach, in the parish of Llanelly in Brecknockshire, about two centuries ago.

Taking the iron manufacture at its lowest ebb about the year 1750, we shall here state the number of furnaces in blast within, or adjoining, the South-Wales coal tract, at four several periods, viz. 1750, 1788, 1796, and 1811; by which the revival and increase of the trade will appear in a satisfactory light.

First Period—about the year 1750, or immediately before the introduction of pit-coal coke instead of wood charcoal.

Place.	County.	Number of Furnaces.	Annual Tonnage of Pig Iron.
Pent y Pool	Monmouth	2	900
Llanelly	Brecon	1	400
Yays Kedwin ...	Brecon	1	200
Neath	Glamorgan	1	200
Caerphili	Glamorgan	1	200
Kidwelly	Caermarthen	1	100
		7	2000

The scarcity of charcoal, and the consequent decline of trade, is here evident: Llanelly furnace producing only 400 tons a year; whereas, by the accounts preserved, it appears that about the year 1720, when wood was more plenty, the furnace there turned out 25 tons per week for 40 weeks in the year; which amounts to 1000 tons.

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Second

MANUFACTURES.

Second Period, in the year 1788, when the seven
furnaces of the former period had increased to 15; of
which seven were worked with wood charcoal, and
eight with pitcoal coke.

Charcoal Blast.			Pit-coal Blast.		
County.	Number of Furnaces.	Annual Tonnage.	County.	Number of Furnaces.	Annual Tonnage.
South	3	2100	Glamorgan	6	6600
Glamorgan	3	1800	Brecon	2	1600
Merthyr	1	400			
Wood	7	4300		8	8200
Pit-coal	8	8200			
Total	15	12500			

Third Period, in the year 1796, when it was in
contemplation by the Legislature to impose a tax upon
iron; and exact returns were procured of the
quantities made at the respective furnaces. At this
time, the seven furnaces of the first period had in-

Abstract of the number of furnaces, and tonnage of pig-iron made in Great Britain, from the returns of 1796.

District.	Number of Furnaces.	Tons each Furnace.	Total.
England	76	9644	73308
South Wales	25	1375½	34391
South Dovey, a charcoal work, nearly silent ... }	1	150	150
North Wales	1	1144	1144
Scotland	17	946	16086
120 furnaces.			125,079 Tons.

Average produce of each furnace, 1042 tons.

Fourth Period, in the year 1811, when charcoal furnaces had almost totally disappeared, and powerful steam engines had long been in common use.

Works.	Parish.	County.	Number of Furnaces.		Rolling Mills.
				Forges.	
Cyfarthfa	Merthyr Tudful	Glamorgan	6	1	2
Dowlais	Merthyr Tudful	Glamorgan	4	1	2
Plymouth	Merthyr Tudful	Glamorgan	4	—	1
Pen Daron	Merthyr Tudful	Glamorgan	3	—	2
Aber Dâr	Aber Dâr	Glamorgan	3	—	—
Aber Nant	Aber Dâr	Glamorgan	3	—	—
Neath Abbey ...	Cadoxton	Glamorgan	2	—	—
Blaen Avon	Llanfoist	Monmouth	5	—	—
Tredegar	Bedwelty	Monmouth	4	—	1
Sirhowy	Bedwelty	Monmouth	2	—	—
Nant y Glo	Aberystwyth	Monmouth	2	—	—
Ebwy Vale, or Pen y Cae ... }	Aberystwyth	Monmouth	2	—	—
Blaen Dâr	Trevethin	Monmouth	2	—	—
Troshant	Trevethin	Monmouth	1	3	—
Tintern	Tintern	Monmouth	1	2	{ And wire-works
Clydach	Llanelly	Brecon	2	1	
Beaufort	Llangatock	Brecon	2	1	—
Blaen Rannet ...	Llangynydr	Brecon	2	—	—
Hirwaun	Penderyn	Brecon	2	—	1
Ynys Kedwin ...	Vystrad Gynlas	Brecon	1	2	{ Below at Clydach
Llanelly	Llanelly	Caermarthen	2	1	
Caermarthen		Caermarthen	1	1	—
Total			56	—	—

The number of furnaces inserted in the above list is 56, being *eight* times the number of the *first period* in 1750; and owing to improvements in steam engines, puddling, and other processes, turning out no less than about 34 times the quantity of iron.

In September 1811, when we last visited the coal tract, there were more furnaces than we have above enumerated, in being, but then *silent*: at Vasteg, in Monmouthshire, two furnaces; at Melin Court, near Neath, one furnace, and two forges, &c. Bedford new furnace, between Bridge-End and Margam, was then in building. Tintern, and Caermarthen furnaces were the only ones using wood charcoal. The number of forges in the above list is 13, and 11 rolling-mills: there are about 14 forges more, besides several rolling-mills, in different places, detached from the furnaces.

The *quantity* of pig-iron made in each furnace differs considerably in proportion to the construction, power of blast, quality of materials, and other circumstances: in the progress of improvement the quantity advanced from 20 to 30 tons per week: the late Mr. John Wilkinson's father, himself a metallurgist, came purposely into Brecknockshire to see a furnace making 40 tons in a week: he observed—"I knew it could be done, but never saw it before." The quantity steadily advanced to 60 and 80 tons in some weeks. When a furnace at Clydach made 80 tons, another at Cyfarthfa claimed the superiority, for having made 84 tons the preceding week. At Ynys Vach, near Merthyr Tudful, are two furnaces, belonging to the Cyfarthfa Company, called Ffwrnes Vach, and Ffwrnes Newydd: the latter has uncommon powers; for several weeks, in the winter of 1810, it turned out 105 tons per week; which is the greatest quantity we have any where heard of.

Low estimates calculate upon 1200 tons as the annual produce of each furnace. It was reported that the 17 furnaces of Merthyr Tudful, in the year 1811, made 30,000 tons of pig-iron; which is at the rate of nearly 1765 tons each. Forty tons per week for 40 weeks in the year, will be 1600 tons; but taking into the account the furnaces of lesser powers, and reducing the average annual quantity of each furnace to 1400 tons, the total yearly amount made by the 56 furnaces of the South Wales coal tract, will be 78,400 tons: which in the manufacture require—

Ironstone,	235,200 tons,
Limestone,	58,800 do.
Coal,	235,200 do.

The above quantity of pig-iron will produce 50,580 tons of finished bar-iron; which in the process will consume of coal about 235,200 tons more: making the consumption of coal to be 470,400 tons *per year*, exclusive of the minor branches of manufacture.

The furnaces and forges, in colliers, miners, firemen, artisans, &c. employ from 12 to 15,000 men, at the rate of from 40*l.* to 150*l.* each per year.

The articles of manufacture are: pig, bar, and rod iron, castings, tram-rails, tram-waggons, mould-boards, &c.; bolts, sheets for the tanners, roofs for buildings, bridges, boats for canals, wheel and hand-barrows, gates, hurdles, &c. Mr. Morecroft had a horse-shoe manufactory erected at Merthyr Tudful, which is now converted to another purpose.

The iron manufacture, in common with others, experienced the effect of the late non-intercourse system; the annual quantity was almost every where reduced, and several furnaces became totally silent: but after the battle of Leipsic, the steam engines and massy bellows

MANUFACTURES.

s have recovered their breath, and the wheels velocity; even additional new furnaces are in uction; and may they never again become asth- upon a similar occasion.

was stated by a gentleman conversant in the iron that were the iron produce of England and divided into 30 equal parts,

shire and Staffordshire would supply	15 parts,
Wales	10
the rest of England and North Wales	5
	—
	30 parts.
	—

rthyr Tudful.—The celebrity of this spot, arising from its productiveness in iron, requires some particular account. About the year 1750, it exhibited symptoms of its subsequent wealth and population, than other mountainous villages in the Glamorgan

forty square miles, for 99 years, commencing in 1755, at the low rent of 200*l.* *per annum.*

After securing such a lucrative bargain, it does not appear that, as an iron-master, he went much further for the first ten years, than erecting and working one blast-furnace: he next erected a forge to render pig-iron malleable: and about the commencement of the American war, he established a cannon foundery at Cyfarthfa, as he had contracted with Government to supply them with powerful pieces of logic to argue the sovereignty of the seas with the thundering logicians of France, Spain, Holland, and the United States of America. This contract turned out a more profitable concern to Mr. Bacon than to the nation. Towards the close of the war he transferred the cannon foundery to the Carron Company in Scotland, and procured a seat in parliament for Aylesbury. Now, considering himself as moving in a superior orbit, he transferred, in the year 1783, the terrestrial concerns of his lease and iron-works at Cyfarthfa to the late Richard Crawshay, Esq. reserving to himself and assigns a clear annuity of 10,000*l.* during the remaining term of the lease, which will expire in 1854.

This last was a transfer profitable to all parties—to Mr. Bacon—to Mr. Crawshay, and to the public at large: from it we may date the rapid growth of Merthyr Tudful. Mr. Bacon left Hercules there in his cradle: Mr. Crawshay, in conjunction with the proprietors of the three other independent works of Pen Daron, Dowlais, and Plymouth, nurtured the infant committed to their trust to its present gigantic size. Mr. Crawshay was completely a man of business, possessed of skill, assiduity, and perseverance, in a very eminent degree. He first introduced into South Wales
the

the process of "puddling" iron in its fluid state: but by this means the aggregate annual *quantity* of iron was increased at the expense of *quality*. Some of this puddled iron, during the imperfect state of the process, was used in strong bars in the bottom of a coal-pit near Llan Hary: the pit being deserted, the iron remained immersed in the water of the coal-pit six years; and then taken up, and used for rural purposes, was found equal in tenacity to the best Swedish iron. Chemists may account for the *natural* process which thus ameliorated the quality of the iron in *six years*; and may probably give directions how to apply the same principles *artificially*, so as to have the same effect upon imperfectly-reduced iron in a *six hours'* process. The process of puddling was adopted by Mr. Crawshay about the year 1784: in 1791, Mr. Humfroy, of the adjoining works at Pen Daron, improved the process so materially, as to be from that period adopted in all the furnaces.

The accumulation of immense wealth has, not unfrequently, occasioned its possessors to be not only parsimonious and selfish, but also in some instances tyrannical. This was not the case with Mr. Crawshay: he cordially participated in the promotion of public improvements: he subscribed 70,000*l.* towards the formation of two neighbouring canals: when the increase of population at Merthyr required an additional place of worship for those attached to the established form, when conventicles were erected almost in every avenue, he liberally built an elegant octagon chapel, and endowed it at his own expense, which was opened for divine service on Sunday, September 1st, 1805. He left establishments at Cyfarthfa, to the amount of several hundred thousand pounds; the
iron

iron frams, waggons, &c., in the underground-works were valued at 50,000*l.*; besides a very considerable property, real and personal, with which we have no concern.

Ill-founded reflections sometimes imply that Wales is robbed of its wealth by strangers: this does not apply to Mr. C.: he left Wales richer than he found it: he carried very little away with him: his princely fortune is still afloat in circulation.

Anecdotes are however related, of some very lucrative bargains being made by adventurers in the iron and coal mines, some time back. A small property in the coal tract is said to have been sold about the close of the American war for 400*l.*; from which the purchasers or their representatives have since returned their income to Government at 16,000*l.* a year; whilst at the same time the poor vendor breathed his last in a parochial work-house.

The iron-works at Cyfarthfa are now carried on under the firm of Crawshay and Hall, the son and son-in-law of the late proprietor.

About the same time that Mr. Bacon occupied the Cyfarthfa mines, Mr. Wilkinson, father of the late wealthy Mr. John Wilkinson of Bradley, Brosely, &c. &c. erected a furnace in the vicinity, at Dowlais, the ruins of which are still visible: the pipe of clay to convey *blast* to the furnace was of such a long date, that by the time the air arrived in the hearth, it had scarcely any other effect than that of *blasting* the projector's fortune; so that had not his son John been a better engineer, litigation in Chancery for his posthumous property would not have created such lively interest.

The quantity of iron made at Merthyr Tudful has
been

MANUFACTURES.

eadily progressive, from the one furnace and
asand tons of iron by Bacon in 1765, to the 17
and 30,000 tons of the four companies in
In the last two years the quantity must have
retrograde; but when peace returns, we should
surprised to find that Merthyr should export
tons within the year.

baptisms in Merthyr Tudful in the year 1710
and the burials 17: in 1750, baptisms 27, bu-

Now, including the village of Coed y Cym-
rich is a suburb raised in consequence of the
ks, the population may amount to 12,000;
ore than double the number of the most popu-
n or parish in Wales.

brokeshire, like the other counties of the coal
as plenty of ironstone strata running parallel
coal-seams; but it has no iron-works, such
ces, forges, &c.

out a century ago. Sir Geo. Barlow rented

We have not heard of any experiment having been made on this patent method upon a large scale. Probably, the Pembrokeshire iron mines will not be worked upon any extensive scale until those of the eastern counties will become exhausted; which in all probability, will not be in less than three or four thousand years; and by that time, Pembrokeshire may have little or no coal to fuse its iron.

2. *Tin-plate Manufacture.*—"Rolling iron plates for tinning, instead of *hammering*, as in France, Sweden, Bohemia, &c., when first introduced into Britain, is not known. Dr. Watson says, that the first account he had seen of its being practised in England was, that it was an invention of Major Hanbury of *Pont y Pool*: the account was written in 1697, and many plates had then been rolled."—*Philos. Trans. Abr.* vol. v.

An old Cambridge workman told Dr. Watson, that he had used tin plates at Lynn in Norfolk, in the year 1730, and that they came from *Pont y Pool*.—*Chem. Ess.* vol. iv. p. 204.

Pont y Pool is still in high repute for the fineness of its tin plates; especially those made by an improved apparatus invented by Mr. Watkin George, the well-known architect of the *Eolus* wheel at the Cyfarthfa iron-works.

The tin-plate manufactory at *Melin Gruffydd*, near Llandaff, is said to be on the largest scale of any in the kingdom. When commerce was open, 13,000 boxes of superfine tin plates, with 225 plates in each box, have been sent within the year from this place to Bristol. The Merthyr Tudful canal runs through the premises, which might be considered an
advan-

MANUFACTURES.

age; but by the tenor of late proceedings, it
is viewed by the proprietors in another light.

Iron tin-works have been established at Cacr Leon,
Llangeston Castle, in Monmouthshire; at Ynys
vyn, and Ynys pen Lluch, in Glamorganshire;
and well in Caermarthenshire, &c.

A very extensive tin-plate manufactory was esta-
blished from 40 to 50 years back at Llechryd, on the
Welsh side of the Teivy, about 7 miles above
Llanidloes. The works passed through the hands of
several persons of very ample fortunes in succession;
but they had never been initiated into the principles of
the iron trade. The late Sir Benjamin Hammett
employed from 300 to 400 hands at these works, when
only 120 men might have managed the tin-plate
manufactory successfully: he however employed them in
other occupations; in improving his demesne at Castle
vyn, in making roads *pro bono publico*, &c.
There are few vestiges of the works remaining;
they continued — they decimated the country of

reign of Charles II., made several experiments, at Pont y Pool, to extract tar and oil from coal; and finally invented the method of lackering iron plates with a brilliant varnish, in the same manner as the Japanese lacked wood. Edward, the son and successor of Thomas Allgood, invented some improvements, and brought the art to its present state of perfection, which is still carried on, both at Pont y Pool and Usk, by the Allgoods, of the fourth or fifth descent from the original founder of the *Pont y Pool Japan ware*.

4. *Copper Works*.—South Wales, though in itself almost destitute of copper ore, as far as yet known, yet imports it in vast quantities from Cornwall, Ireland, Anglesey, &c. to be smelted, and manufactured, owing to its advantageous convenience of water-carriage to the vicinity of cheap fuel. The works belong to several proprietors: the English Company, the Mines Royal, the Birmingham, the Cheadle, and others; and are established at Margam, Neath, Llan-samled, Swansea, Penelawdd, in Glamorganshire, and near Machynys, on the Caermarthenshire side of the river Lloughor, &c.

5. *Miscellanies*.—An attempt was made ten or fifteen years ago, to establish a manufacture of various chemical articles at Melin Gryddan, between Briton Ferry and Neath in Glamorganshire. The articles of manufacture were alum, vitriolic acid, pyrolignous acid, patent colours for dying green, blue, red, yellow, &c. Success did not attend the enterprise, perhaps entirely owing to the state of the times.

SECT. VII.—THE POOR.

It is a commonly received maxim, that the poor laws, in their present form, have very materially contributed to multiply the number of paupers. In countries where poor laws have never been enacted, the industry, parsimony, and moral precaution of the labouring class, render public assessments, similar to our poor-rates, unnecessary: and, what relief is occasionally and voluntarily bestowed, is both given and received as pure charity. With us, the case is quite the reverse: relief given to the poor, under the present system, is not always considered in the light of charity by either party, the relievers or the relieved. The overseer, too commonly, pays the pittance with a growl; and the poor, too frequently receive it tauntingly, with a threat of extorting a more ample allowance by making complaint to a magistrate, who would put the law in execution.

We cannot retrace the wrong steps we have taken in creating a poor-rate, by totally abolishing it: the best policy to be pursued, is that of resorting to ways and means that will gradually and eventually render a rate less grievous: this may be effected by encouraging, if not by enforcing, the peasantry to create, by timely subscriptions, a fund for their own support in the season of dire necessity.

Beneficial Clubs, or Friendly Societies, seem to be the best means adapted to attain such a desirable end; were they founded upon prudent principles, and to become in any degree general.

Clubs of this kind were not uncommon some 50 or 60 years back: some of them admitted too elderly per-

sons

sons at the commencement, who soon became pensioners for life; others disbursed reliefs before they were possessed of an adequate capital: either of these cases, or both, induced embarrassments, and, not unfrequently, insolvency. In consequence of such radical errors, clubs became less and less frequent: some however grew rich, more owing to fortunate circumstances than to foresight. These also, in some instances, found their property not guaranteed by law: the unprincipled could tell them, "I have borrowed your money, but you cannot compel me to refund." This outrage, which actually took place, gave rise to the salutary Act of the 33d year of his present Majesty, intitled, "An Act for the Encouragement and Relief of Friendly Societies." From this period such societies are becoming more numerous; and most of them are established with greater precaution and economy than those of their less prudent and less favoured predecessors.

In 1811 there were no less than 29 societies at Merthyr Tudful; 17 consisting of males, and 12 of females.

One of these societies is called "*The Sympathetic Club*;" the sole object of which is to provide annuities for the widows of *free* members, during their widowhood and good behaviour. A member dying one day short of *three* years from his admission, is not to be considered as a free member. The number of members in 1811 was 160, limited to 200: the capital then was 1000*l.*; with *four* widows on the list, at 20*l.* a year each: contribution 2*s.* per lunar month.

A *second* is called "*The Tradesmen's Society*," founded in 1803: limited number 121; full in 1811: monthly contribution, 1*s.* to the box and 2*d.* for ale: rate of admission in proportion to the state of the fund;

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which

which in 1811, at 500*l.* was two guineas and a half. Admissible persons, from 15 to 45 years of age, and capable of earning 18*s.* per week. During illness, a member of one year's standing to have 6*s.* per week; of two years 10*s.* a week; for one year in both cases: if infirm for a longer term, or incurable, to be reduced to 6*s.* a week. The widow of a member of two years standing without having had any relief, to receive 20*l.*

The remaining societies are founded on the common principles, with from 100 to 200 members in each.

Some friendly societies in the town of Brecon are of 58 years standing. One in 1811, had a capital of 1000*l.* There were in this town in that year 16 societies, 12 of males and four of females.

In the small town of Llandovery, the population of which scarcely exceeds 800, there are *five* beneficial societies, three for men, and two for women; and most of them founded since the passing of that *most excellent* Act in 1793.

In Kydwelli, having a population of about 1400, there were in 1805 *nine* beneficial societies; five for men, and four for women: the latter under the patronage of the Miss Kymmers. It does great credit to the patriotism, as well as to the sympathetic feelings of the nobility and gentry, who patronize and otherwise encourage these very laudable and useful institutions: in some places it tends to support, in others to recover, the national character; and must have a powerful tendency to invigorate, or even to create, a spirit of economy and industry in every individual concerned; a spirit, which the old system, by parochial rates, has almost annihilated among the lower class. The patronage of a person or persons of fortune and popularity, must have a peculiarly good effect upon
the

the success of these kind of institutions: it induces the peasantry more willingly to become members; and it ensures regularity and decorum in all their proceedings and assemblies: it excites a more than common spirit of industry and parsimony. We were credibly informed, that in some female societies, women in indigent circumstances, had nevertheless stretched the point so far as to introduce themselves members of two societies, some of three; from which during illness they received 5*s.* a week from each, which in the former case amounted to 10*s.*, in the latter to 15*s.* a week: what comfort! what consolation, to a spirit of independence, this must afford in the hour of distress!

It is only to be wished that these kind of Societies, somewhat common in towns and populous villages, should be more general in country parishes. Where parishes are not sufficiently populous, two or three might join, and have their meeting in the most central spot: the leading householders of those parishes, clergy and laity, would do well in patronizing such institutions, and subscribe a certain sum monthly or annually for the benefit of the fund. The *ages* of such Honorary Members, need not be enquired into; but the *age* of every candidate for admission, who would make a claim upon the fund during illness, &c. should be carefully attended to; as this point seems to be one of the corner stones upon which the stability of the superstructure will depend. This *age*, probably, should not exceed 40, though in some articles it is extended to 45. Another corner stone, is a proper length of time for the fund to accumulate before any relief in case of illness be allowed: which in some

n b 3

instances

THE POOR.

es does not exceed one year : this attacks the
efore any honey be collected : others more pru-
prolong the period to four years.

he Society called "*The Sons of Humanity*,"
con, a member of *four* years standing is to receive
ly allowance *during illness*, in proportion to the
t of the fund—6s. at 50*l.* ; 7s. at 100*l.* ; 8s. at
9s. at 300*l.* ; and 10s. at 400*l.* On a relapse,
other illness happening within twelve months,
ef to be afforded unless the fund amounts to 100*l.*,
n that case he is to receive 7s. a week until
overs. A member of *seven* years and upwards,
ed by the majority at any general meeting to be
d or infirm to earn a competent maintenance,
ceive 6s. a week, if the fund amounts to 200*l.* ;
to 400*l.* ; and 9s. if to 600*l.*, during life,
c.

ight be prudent, in framing the articles of a
ly Society, to fix a *minimum* and a *maximum*,

cines to the sick poor of the county of Pembroke and town of Haverfordwest; which was well supported by the nobility and gentry.

Parochial Assessments for the relief of the poor are rated by various modes in different parts: 1. In many parishes in Pembrokeshire by the *ploughland* of 100 acres; 2. By the *oxland* of eight acres in some places, of $12\frac{1}{2}$ acres in others; 3. By the *customary* acre; 4. By the *statute* acre; 5. By a rack-rent pound rate; 6. But that mode which still obtains over the greater part of the district is by an ancient and unequal rate, perhaps as old as the reign of William and Mary. This, of course, must be very unequal at present; as one property may be ten times more improved than another. Several such unequally-rated parishes, have had new rates made by professional valuers of property, at very great expenses, from 200*l.* to 1200*l.*, according to the size of the parish: and after all, the new assessment has not unfrequently been litigated, and even quashed at the Quarter Sessions. Parishioners would therefore do well in rectifying unequal assessments among themselves: they could do it infinitely cheaper, and probably so as to give equal, if not greater satisfaction, than when made by professional men at a per poundage or per acreage.

The greater number of parishes make a common cause in maintaining their respective poor: others are subdivided into as many independent portions as they contain of townships or hamlets. A parish in Glamorganshire is divided into nine hamlets, each maintaining its own poor: two hamlets are rated at 2*s.*; two at 8*s.*; two at 12*s.*; one at 13*s.*; and two at 20*s.* per pound, old rate. Here is a tenfold difference. We have observed elsewhere a difference in the same pa-

rishes, of eighteen and twentyfold. The *lower* rates are where Friendly Societies have been established for a considerable time: and, upon an average, the *higher* rates are in the vicinities of extensive and uncultivated *wastes*.

The introduction of *machineries*, for the reduction of manual labour, may be considered, in one light, as a fertile source of national wealth; in another light it is found to be paying Paul by robbing Peter. Before the introduction of carding and spinning machines into some parts of Wales, numerous families of women and children supported themselves by carding and spinning wool for hire or otherwise, in their own houses; many of whom, upon the establishment of manufactories in the neighbourhood, were turned upon their respective parishes. Thrashing-mills have a similar effect; they have thrown many a grey-headed flailman from his accustomed winter's employ; and as it were, sent him by order from the barn-floor to the vestry-room.

Cottage industry has been considerably excited and rewarded, by the judicious premiums distributed for that purpose by the Cardiganshire Agricultural Society.

Similar institutions might with good effect extend their bounties to instances of industry and ability in handicrafts; female industry, not only in the wool, but also in the hemp, flax, and cotton lines, might be rewarded. Women and children might also be induced to be industrious, during the season, in collecting hay-seeds of cock's foot, foxtail, sweet vernal grass, dog's tail, cat's tail, and such grass-seeds as are procured at high prices from distant seedsmen: they may shortly be taught to distinguish and keep separate the several sorts.

Near

Near the red sandstone and grey mountain rocks, in the counties of Brecon and Cardigan, women and children are industrious in collecting lichens for the dyers of the manufacturing districts. From the rocks of the Sugar Loaf and St. Michael's Mount, &c. in Monmouthshire, two old industrious women collected 80*l.* worth of the scarlet lichen in one season, some ten years ago.

Employment to the Poor in years of dearth.—During the great dearth of 1801, when many poor labourers were out of employ, the parish-officers of *Llan Bedr Ystrad Yw*, in the county of Brecon, undertook the ridding of several acres of rough land in the parish, overrun with furze, brushwood, and pollard roots, for the crops of the same during the three first years; and employed thereon all the poor labourers applying for relief, at above ordinary wages, in ridding, preparing the land, and planting potatoes. The produce or crop being sold, kept the poor-rates stationary at 2*s.* 9*d.* per pound, with balance in hand; whilst those of the neighbouring parishes, under the same scale of rate, averaged from 6*s.* to 8*s.* per pound.

Benefactions and legacies for the relief of the poor were much in vogue a century or two back: a new state of things, and a different train of thought in the hour of sickness, at length rendered such bequests unfashionable. In some instances these well intended charities have been grossly abused; in others, they still operate so as to keep the poor-rates at a permanently low rate.

At Tenby, in Pembrokeshire, such benefactions and legacies are so numerous, that the poor-rate seldom exceeds 1*s.* per pound. In the church is a table of
bene-

THE POOR.

tions; including among others, one by *Wil-*
isam, tradesman, in 1633, which is recorded in
following lines:

" Two hundred poundes
and fifty more,
He gave this towne
to helpe the poore:
The use of one on cloth
and coles bestowe,
For twelve decrepit
mean and lowe:
Let 50 poundes to five
be yearly lent;—
The others use on
Burgess' sons be spent."

poor-laws, in their present state, are far from
satisfactory, especially in some cases of *settle-*
ment *occupation*: numerous litigations of course
to the no small increase of the parochial rates.

SECT. VIII.—POPULATION.

DR. PRICE's theory of depopulation had its day: and had he wrote during the agency of a certain personage on the theatre of Europe, his calculations would have been more in unison with matters of fact. Now, Mr. Malthus's counter theory of superabundant population has excited alarm: a few years of peace, they say, attended by the eradication of the small-pox, will increase the population of Britain beyond its means of support. Means of support must increase with the population: the cultivable wastes must produce corn; and the vast preponderancy of grass-land must be rendered arable. Systems of agriculture, superior to the best at present, may yet be introduced. Crowded hives must send out swarms or colonies. New Holland may become the rival of China in population. The vast Continents of America and Africa do not at present support a hundredth part of the population of which they are naturally capable.

As to the present state of population in Wales, the most certain data in our possession are the two enumerations by the authority of Government in the years 1801 and 1811; which, according to the published accounts at those respective periods, were as follow.

South

POPULATION.

South Wales.

	No. in 1801.		No. in 1811.
.....	19,050	....	21,799
.....	31,633	....	37,750
an	42,956	....	50,332
ke	56,280	....	60,615
rthen	67,317	....	77,217
gan	71,525	....	81,268
	<hr/> 288,761	....	<hr/>328,981

North Wales.

	No. in 1801.		No. in 1811.
y- ydd	29,506	....	30,924
y	33,806	....	37,092
.....	39,622	....	46,518
rvon	41,521	....	49,019
omery	47,978	....	50,606
h	60,352	....	64,240

Increase in the several counties of Wales, in ten years, from 1801 to 1811.

South Wales.

County.	Increase.
Radnor	2749
Pembroke	4335
Brecon	6117
Cardigan	7376
Glamorgan	9743
Caermarthen	9900
	<hr/>
	40,220

North Wales.

County.	Increase.
Meirionydd	1418
Montgomery	2628
Denbigh	3888
Anglesey	3286
Flint	6896
Caernarvon	7498

North Wales 25,614

South Wales 40,220

Increase of population in }
Wales, in 10 years } 65,834

The foregoing statement shews that the births, and ingress of strangers into Wales, in the ten years, exceeded the burials, and egress of natives, during the same period, by 65,834 souls. The rate of increase is one person more in 1811, for every 84 persons that were alive in 1801. The rate of increase in the several counties

POPULATION.

s is very various: from one in five to one in
; as appears by the following list.

South Wales.

, one in	$5\frac{1}{5}$
an,	$5\frac{1}{4}$
arthen,	$6\frac{1}{4}$
t,	7
rgan,	$7\frac{1}{7}$
oke,	13

North Wales.

Caernarvon, one in	$5\frac{1}{4}$
Flint,	$5\frac{1}{4}$
Anglesey,	$10\frac{1}{4}$
Denbigh,	$15\frac{1}{4}$
Montgomery,	$18\frac{1}{4}$
Meirionydd,	$20\frac{1}{4}$

imilar variety in the rate of increase occurs in the
of the English counties: those of Stafford and
ter one in four each; Chester one in five; Derby,
er, and Salop, one in six each; Gloucester one
; Oxford one in 11; Hereford one in 18; War-
one in 19; Radnor being so high as one in
throws a suspicion upon the accuracy of the

County.	Square Miles by Temple- man.	Acres from ditto.	Square Miles by C. Smith.	Acres by ditto.	Acres per Head.	Persons on a Square Mile.
Pembroke	520	446,160	575	493,350	8 $\frac{1}{4}$	105
Glamorgan	670	574,860	822	705,276	8 $\frac{1}{2}$	98
Caermarthen	869	745,602	928	796,224	10 $\frac{1}{4}$	83
Cardigan	646	554,268	726	622,908	12 $\frac{1}{2}$	70
Brecon	770	660,660	731	627,198	16 $\frac{2}{3}$	51
Radnor	385	330,330	455	390,390	17 $\frac{1}{2}$	47
Total	3860	3,311,880	4237	3,635,346		

CHAP. XVII.

OBSTACLES TO IMPROVEMENT.

SOIL and CLIMATE.—In many places, sterility of soil forbids much improvement; in others unhealthiness of climate: and as the poorest soil is commonly in the highest elevation, they are too frequently combined, and constituting an insurmountable difficulty.

Where *soil only* is unfavourable, the art and industry of man may perform wonders; but where climate opposes against improvement, man, great as he is, does but little towards rendering it more genial: such as judicious tillage, and a judicious arrangement of plantations, are the only means of improving it.

and in a lesser degree the north of Pembroke and Caermarthen, the north-west of Brecon, and the west of Radnor. No part of Glamorgan can be said to be very inconvenient for manure: indeed some say that too great a convenience for lime as a forcing manure, is an obstacle to improvement in some parts of the Vale: but this apparently applies to future time more than to either the past or the present. Some of the vale farms have undergone the liming ordeal of from 350 to 450 bushels an acre repeatedly these 60 years back: these, by this time, may be saturated with lime; though hitherto, it is asserted by the advocates of the practice, it has only converted a too stiff loam into a free-working and a free-cropping soil.

3. *The Tax upon Coal* carried coastwise, is a grievous obstacle where it operates; and that must ever be in places the least favoured with resources. Limestone is conveyed at a considerable expense to the coasts of Cardiganshire: coal to burn that limestone follows, with a duty imposed upon it: when reduced to lime, and carried up the country along 20 or 30 miles of indifferent roads, it must be nearly as dear as pepper.

4. *Bad Roads* have been very serious obstacles; as they prohibited the first attempts at improvements. The evil however diminishes gradually: new roads have been opened, others are in making, in some of the best directions possible for the distribution of lime manure, &c. in parts theretofore inaccessible, excepting for horses and panniers. Still, much remains to be done, especially on the clayey soils of the coal and shale tracts.

OBSTACLES TO IMPROVEMENT.

Open Wastes are considered as obstacles; as they encourage a kind of independence, which is too commonly the parent of indolence, in the lower class, who dwell on their borders, or have erected cottages, and make encroachments upon them.

The Intermixture of Property, and that in many pieces of few acres, and still less, even in lots of a few roods, is such in many places, especially in the western counties, that improvements in draining, irrigation, fencing, manuring, &c. &c. are impracticable: and in some instances there is an inveterate aversion in proprietors from either exchanging or selling a square yard of their great grandsire's land. This inconvenient relic of the gavel-kind tenure may be removed to the best advantage by the operation of enclosure, and the interference of the Commissioners, under a clause in the act to that effect. Excepting the detached hills, interspersed through

from the proposed cut, and make his *charge* accordingly."—*Mr. Clark, Orig. Rep. of Brecon*, p. 16.

"There is too much truth in this observation. The Welsh were always fond of law; and this has been one principal error which has prevented this country being more improved than it has been: we have too many lawyers, and too many parsons: thank God! Lord Kenyon's bill will relieve the country in time."—*An anonymous Note in the margin of the Original Brecon Report*, p. 16.

We are not aware who this Brecknockshire annotator is: but we may be almost certain that he does not act either at the bar or in the pulpit.

"Very little land is well watered, though much might be done, were the law amended, to empower the turning of the water."—*Mr. Franklen, App. to Orig. Rep. of Glamorgan*.

7. It may be considered as presumption in us to consider any description of *landlords* as obstacles to improvements: but such they are, if, by reading treatises on the low expenses, and the exaggerated profits of farming, written in distant parts, they expect such statements to apply too closely to the circumstances of their own estates; whatever may be the difference in soil, climate, advantages of situation as to markets, manure, &c. &c.; and advance their rents accordingly.

8. The author of "*The Practical Norfolk Farmer*," published in 1808, attributes the decayed state of the quick fences in that county to a revolution in the mode of *land agency*.

"Forty years ago, a farm was never leased without
112 a clause

OBSTACLES TO IMPROVEMENT.

use compelling the tenant to ditch one fourteenth of the fences of the farm yearly, the moiety of which was paid by the landlord, limiting his share of expense to 6d. per rod: by this excellent plan fences were always kept in a proper state. *The lords* of the estates (at that time generally selected the most intelligent and best educated farmers, then supposed to have a knowledge of the value of land), attended the tenants at the proper time, to see the work performed, to fix on the places to have new hedges, and to value the top-wood of the pollards, if growing in the fences; and in the summer months revisiting them again, and measuring the work.

By this method no evasion could take place, nor depredation be committed on the timber, &c. by poachers, without its coming to their knowledge; as the farm being carefully looked over twice in the year at proper intervals, rendered it impossible,

But since gentlemen of landed property have

author now quoted. The time is approaching, when the stability of their high valuations will be put to the test: hitherto it may be said in their favour, that, by advancing the property tax, they must have greatly increased the revenue, at a time when it was most essentially necessary.

9. *Miscellanies*.—"Among the obstacles to improvement, may be stated the local prejudices of the common farmers, and the present mode of paying tithes in kind. Should the Board of Agriculture be enabled, through its united wisdom and influence, to procure the adoption of some eligible plan for commuting the payment of tithes, I do not know of any one measure that would be productive of so much good to the country at large, to the industrious farmer in particular, and, ultimately, to that venerable body, whose support principally arises from that portion of the products of the earth."—*Mr. Hassall, Orig. Rep. of Caerm.* p. 52.

"Are there any obstacles to improvement?" "Yes, three: the want of leases; a power to enclose wastes; and a commutation for tithes."—*Mr. Franklen, Orig. Rep. of Glamorgan*, p. 69.

Want of capital prevents many industrious tenants improving their farms: and often a timidity in laying out, even when the farmer has it, lest it may not make a suitable return.

Want also of convenient buildings, especially in the more hilly tracts, causes great discouragement to the farmer in cultivating the soil.

Want of permission to break up old hide-bound pastures, which many hold too inviolably sacred: by this the tenant is compelled to keep the plough perpetually

OBSTACLES TO IMPROVEMENT.

in the same fields; and under such circumstances
it of no regular system, however desirous the
may be of adopting it.

These may be added, vulgar errors, local pre-
judice, bigotry to system, and contempt of innova-

Vermin.—Though it may be deemed ludicrous
for writers to class “moles, small birds, and
snakes,” among the *obstacles to improvement*; yet
all kinds may be included in the *catalogue*
of obstacles; among which one of our correspondents
has placed a triad—*foxes, fox-hounds, and fox-*

CHAP. XVII.

MISCELLANIES.

SECT. I.—AGRICULTURAL SOCIETIES.

I. THE *Brecon* Agricultural Society is the earliest institution of the kind in Wales; and nearly, if not altogether, the earliest in Britain. The articles of the Society were printed in April 1755. In June following, Sir Edward Williams of Llanggoed castle, proposed premiums for the best turnip crops on small farms; the culture thereof being previously adopted by most of the original members. This was afterwards followed by an order for providing a proper horse harrow, and two hand hoes, one of twelve and the other of ten inches, to be adopted as patterns by the claimants for the premiums of the Society. As a further encouragement, the best turnip seed was gratuitously given to such farmers, under 40*l.* a year rent, as should engage to sow them. A regular turnip hoer was also engaged at an annual salary, by the Society, to instruct the husbandmen of the county in the proper culture and management of their crops.

As an encouragement for the servants in agriculture to be industrious in the cultivation of this useful vegetable, a certain number of silver medals were struck, of the value of one guinea each, bearing as an inscription, "*A Reward for Diligence;*" and upon the area of the reverse, a Plough, Harrow, and a Turnip-Hoe,

AGRICULTURAL SOCIETIES.

the inscription, "Given by the Brecon Agricultural Society." These were to be distributed throughout the county: one to each hundred; to be given to the farmer of the hundred as should be reported by the Society's Inspector to have raised the best crops of turnips within his respective hundred: the man's name and the date of the year, to be engraved upon the centre of the medal, within the inscription.

The first medal within the hundred of Crickhowel was given in December 1759, to the servant of the late Mr. Ramsey of Cwm-gu.

These were the means first adopted by the Brecon Agricultural Society, for the introduction of that important and beneficial system, which has since been so deservedly the basis of agricultural rotation by the best farmers of the county. Previous to this, their system, had any, was so wretched, that it is better consigned to oblivion than recorded to posterity.

In September 1755, this Society offered a premium for the best piece of drab-coloured cloth manufactured

where, by a communication of separate lights, the whole body gradually acquires a treasure of solid and practical science: look upon it in what way you will, it is still prudent, useful, amiable!"—*Polit. Surv.* p. 417.

About this time, this Society seems to have been in its meridian; and having attained some of its objects, and failed in others, it has gradually shewn some symptoms of decline: it succeeded in introducing a pretty general culture of turnips and clover; but the encouragement of the woollen manufacture was abandoned about the year 1780. From that time the Society confined its premiums to the following articles: 1. Drilled turnip crops; 2. Improvement of coarse, uncultivated land; 3. Draining; 4. Rye, vetch, cole, &c. stubble crops, for spring-feeding; 5. Top-dressing clover, and other fresh grasses, with peat-ashes; 6. Raising of trees for plantations, and thorns, &c. for fences; 7. Improvement of ploughs, and lessening the number of draught-horses or oxen; 8. The encouragement of women to reap wheat; 9. The rewards of industry, in servants and labourers; 10. Destruction of vermin; 11. Improvement of live stock; 12. The best fleece of wool from sheep bred in the county; 13. The greatest quantity and best quality of clover seed, raised in the hundreds of Buallt, Merthyr, or Devynnock, being the least improved parts of the county; 14. The prevention of smut in wheat.

The number of premiums offered in 1811 was 38; amounting to 187*l.* 6*s.*; exclusive of 2*l.* per acre for draining boggy land; 5*s.* per acre for hoeing turnips; 5*s.* per acre for green crops on wheat stubbles for spring feeding; 10*s.* per thousand for raising holly plants, and 2*s.* 6*d.* per ditto for hawthorn ditto.

The Brecon Society at its commencement offered a premium

AGRICULTURAL SOCIETIES.

am for hoeing turnips in each hundred separately, and latterly, premiums for raising clover seed in three least improved hundreds: in other respects the Society considered the county as one tract; from which it might be foreseen, that the hundreds of Tal-y-bon and Crickhowel would be much more benefited than the hundreds of Buallt and Devynnock.

The second Society, in point of time, may be traced to *Glamorgan*, instituted some years subsequent to the formation of Brecon. The premiums annually offered by the Society amounted to about six score pounds in the year 1800, and the like sum of the western division: the Glamorgan being the boundary; and the candidates from the two ends of the county not to be in competition with the superiority of the Vale soil. And to encourage the small farmers in the hills to cultivate turnips to winter-feed their sheep and cattle, the

surveyor in each hundred—for the best gate and twig hurdles for folding on turnips.

The founder, and zealous supporter of this Society, as well as its treasurer and secretary, from its institution about the year 1770 until within these few last years, was John Franklen, Esq. of Llan Mihangel. Being himself an active improver, and farming upon an extensive scale, with about 40,000 acres of vale land under his care as an agent, it is the more to be regretted that his sanguine expectations of the utility of the institution have not been more generally realized. About 28 years after the founding of the society, its worthy secretary stated the following particulars respecting the progress then made in improvements, in a circular letter to each of the subscribing members.

“ This Society has been already very successful in introducing the culture of turnips, cabbages, and potatoes in the fields, which undoubtedly are very beneficial to the farmers, as well as an improvement to the soil, by supporting a much larger stock than could otherwise be kept: there has been a great quantity of land reclaimed, and made profitable, owing to the rewards given by this Society: and the annual competition for the premiums given for the best yearling colts, bulls, boars, and rams, evinces their utility. And as this Society does not give the same kind of premiums twice to the same farmer, their encouragement, and the great force of example (which only can influence the farmers) will by degrees extend its benefit to every part of the county, even the hills, where turnips would be extremely advantageous, in providing winter and spring food for cattle and sheep, on account of the scarcity of hay. Some good crops of mangel-wurzel and ruta бага have been raised; the former
housed

AGRICULTURAL SOCIETIES.

at Michaelmas for spring feeding cattle, sheep, and pigs; and the latter is found to stand the winter and continue sound longer in the spring than turnips, so as to be good keep for ewes and in April. Potatoes raised in drills with the fallow in the summer fallows, have been found to be winter and spring food for horses, cattle, sheep, and pigs.

The utility and importance of Provincial Societies for the encouragement of Agriculture, are now generally acknowledged: they diffuse a spirit of emulation and industry among the farmers of every county, and they promote the study and knowledge of Agriculture, by corresponding with each other, and selecting and rewarding a course of regular experiments, and publishing the effects thereof.

The Gentlemen of this county, from various sources of information, and from their own experience, have made many improvements as to mode of tillage,

gentlemen of the western end finding it too inconvenient to attend regularly at the general meetings in Cowbridge; whilst those of the eastern end consider Swansea too remote to attend at the subdivision meetings. Three Societies, it is said, ought to be established; one in the Vale; another in the portion west of Ogmore; and a third in the hilly part of the coal tract.

III. "The Rules, Orders, and Premiums of the Society for the Encouragement of Agriculture and Industry in the County of *Caermarthen*," had for a motto,

"———would a generous AID

"To honest toil, in Cambria's hilly tracts,

"Be found sufficient?—"

Unfortunately, the answer of this question turned out, by the event, to be in the *negative*: but we cannot agree with Mr. Malkin, that the miscarriage of this institution was owing to its "aiming at the fanciful refinements of an imaginary system, rather than directing the judgment and skill of gentlemen and farmers to practical purposes."—*8vo. edit.* II. 399. On the contrary, the Rules and Orders of the Society seem to have been well adapted to ensure success. The 11th and 12th articles avowed, "that as the principal design of this institution is to promote the introduction of an improved system of husbandry, and planting, the premiums shall be more immediately directed for those purposes:"—"That premiums be annually offered for the encouragement of industry, and good behaviour, among servants in husbandry and labourers."

The premiums offered in 1802, were the following:

Class I. to be adjudged in *April*:—For planting forest trees, winter vetches, draining wet land, raising clover seed, black bulls, spinning of yarn.

Class

AGRICULTURAL SOCIETIES.

II. to be adjudged in *July*:—For fencing and
ing land, summer vetches, buck-wheat for ma-
hawthorn plants for sale, planting willows, &c.
dles.

III. to be adjudged in *September*:—For field
s, hoers of turnips, servants in husbandry,
ng cottagers.

IV. to be adjudged in *October*:—For the best
of turnips, winter cabbages, corn after meliorat-
ps, alternation of corn and green crops.

number of premiums was 57, amounting to
3*s.* 6*d.* The premiums claimed in this year
ed in the 1st class to 32*l.* 17*s.*—in the 2d class
s.—in the 3d class 23*l.* 15*s.*—in the 4th class
—in all 99*l.* 13*s.*

n these data, it cannot be fairly inferred that the
failed in its objects owing to any radical error
institution; but rather from the apathy of some
subscribers, and from the want of a more active
f competition among the farmers.

and good behaviour, among cottagers and labourers in husbandry."

This Society has hitherto been successful in the attainment of its objects; and will continue so as long as unanimity prevails among the leading subscribers, and a spirit of competition actuates the numerous claimants.

This Society divides the county into Lower and Upper Divisions; the river Aeron being the boundary.

Cardiganshire Agricultural Society.

Premiums offered for the Year 1813.

For what.	No.	Amount.	Premiums adjudged in 1812.	
			No.	Amount.
The best of each species of live stock	14	37 16 0	12	35 14 0
Raising of clover seed	4	15 15 0	—	—
— rye-grass ditto	2	3 3 0	1	2 2 0
Waste land reclaimed	3	10 10 0	3	10 10 0
Winter vetches	2	7 7 0	1	4 4 0
Summer vetches	2	5 5 0	—	—
Turnips	3	15 15 0	1	3 3 0
Buck-wheat for manure	2	5 5 0	—	—
Corn after a meliorating crop	1	5 5 0	1	3 3 0
Crops of flax	2	3 3 0	—	—
Corn and pulse in alternation	1	5 5 0	1	5 5 0
Planting forest trees	2	5 5 0	3	9 9 0
Ditto by tenants	2	5 5 0	—	—
Planting apple trees	2	8 8 0	2	8 8 0
— willow for hurdles	2	5 5 0	1	3 3 0
Raising forest trees for sale	2	5 5 0	2	5 5 0
— hawthorn plants for ditto	2	3 3 0	1	2 2 0
Hedging with quicks	2	5 5 0	1	3 3 0
Stone-wall fences	2	7 7 0	2	7 7 0
Draining	4	13 13 0	3	12 12 0
Watering	2	5 5 0	2	5 5 0
Marking	2	7 7 0	—	—
Bounties to the poor for manufacture	8	7 10 0	2	2 10 0
Ditto for rearing children without relief	3	4 14 6	3	4 14 6
Turnip-hoers by the acre	—	10 10 0	5	5 12 0
Totals	71	206 9 6	47	133 11 6

This

This Society, in 1808, among its attentions to numerous beneficial objects, being anxiously desirous of improving in size and value the breed of horses, gave a premium of *sixty guineas* to the person who produced the most approved stallion, of the strong hunter kind, upon a day appointed, and afterwards regularly attended with the same at three market towns within the county, from the first week in April till Midsummer; and requiring no more than one guinea *per mare* for the season.

In 1809 two premiums of *forty guineas* each were given for two stallions to cover under certain regulations, one in the Lower and the other in the Upper Division of the county. A visible improvement in the breed of horses has already taken place.

In some years the claimants for premiums have been more numerous than in the preceding Table for 1812; especially for hoed turnip crops, draining, raising clover seed, cottage manufacture of flannels and stockings, &c.

V. The Farmers' Club, or Sheep-shearing, which was annually held, for several years, at Narberth, at length gave way to "*The Society for the Encouragement of Agriculture, and Internal Improvement, in the County of Pembroke.*" The premiums for 1813 were as under.

	£	s.	d.
10 premiums for the best, &c. of the several species of live stock,	31	10	0
3 ditto for the best, second, and third crops of turnips,	10	10	0
3 ditto for the best, second, and third cleanest crops of wheat on cloverleys,	11	0	6
3 ditto for 1st, 2d, and 3d greatest quantity of land prepared for wheat, barley, or turnips, by penning or folding sheep thereon,	12	12	0
3 ditto to the three best companies of turnip-hoers,	6	6	0
Ditto to the best plough, harrow, and hoe-wrights in the several districts of the county,	5	5	0
3 ditto to the three best Welsh ploughmen, at a match the 20th of October, 1813, }	3	3	0
1 ditto to the greatest orchard planter,	5	5	0
1 ditto for the best flavoured cheese made from the rennet of dry maws,	2	2	0
27	£87	13	6

This county, from its varieties of soils and situations, requires, at least, two distinct Societies; one for the division *below*, and the other for the division *above* the mountains; otherwise it seems unfair to start the hundred of Castle Martin against the hundred of Kemmaes, &c.

VI. An Agricultural Society commenced in *Radnorshire* several years ago: at length the premiums were confined to the smaller farmers; a regulation that
 [S. WALES. VOL. II.] k k ensured

ensured the speedy dissolution of the institution. Another Society, upon a broader basis, was established about the close of the year 1809, which is patronized by all the principal land-owners in the county. Its meetings are held alternately at Presteign in the lower end of the county, and Pen y Bont in the central part; and its attention hitherto has been directed chiefly to the improvement of the breeds of horned cattle, horses, and sheep—the culture of turnips—the best mode of ploughing—and the encouragement of those servants in husbandry who have continued the longest time in the same family. The Herefordshire breed of cattle—the turnip crops that had been sown in drills—and the North-country plough drawn by two horses a-breast, have been most successful in gaining prizes.

As the Upper Division of this county, like most others in Wales, is much inferior to the Lower in soil and situation, &c. one premium of five guineas is given for the best crop of turnips in the lower hundreds of Pain's Castle, Radnor, and Knighton; and the like premium of five guineas for the best crop in the upper hundreds of Colwyn, Cefn Llys, and Rhaiadr: but still, the division by hundreds is far from being equitable, as the hundred of Knighton contains much of as poor land as any in Radnorshire, which can never enter into competition with the banks of the Wye and the Lug, &c., in the hundreds of Pain's Castle and Radnor.

The great varieties of soil, and the consequent difficulty of dividing counties into tracts for competition upon equal grounds, stand among the obstacles to the permanent success of these useful and patriotic institutions. The office of *inspector of crops* is a situation of responsibility, and requires more than a common share

share of capacity and integrity. Among the banes of Agricultural Societies may be reckoned, too high bills of fare, campaign, sherry, &c. Aware of this, the Pembrokeshire Society, to procure more readily the attendance of farmers at their meetings, has a standing order, "that dinners shall not exceed half a crown each person, and that every one present will be permitted to chuse his own beverage."

SECT. II.—WEIGHTS AND MEASURES.

NATIVE commodities only are bought and sold by the provincial weights and measures.

1. *Wool* seems to have been formerly sold in the north of Pembrokeshire, and in the adjoining tract of Cardiganshire, by the *maen* of 28 lb., being the English todd, or 1 qr. of a cwt.: its subdivisions were—2 lb. avoirdupois in the *pwys*; $3\frac{1}{2}$ pwys in the *topston*; and four *topstons* in the *maen*. This *maen*, of late, is reduced to 26 lb. Half a todd, or the English stone, with 1 lb. ingrain, or 15 lb., is the most common stone of wool, when it is sold to staplers and others for the English markets. The home-dealers buy and sell wool by the several provincial stones of 4, 5, 6, 7, 11, 13, 14, 15, 17, 18, 21, 22, 24, and 26 pounds, according to the customs of the respective markets.

2. *Salted butter* in firkins, tubs, &c. is sold by the pound avoirdupois of 16 oz. The pound of fresh butter varies in different markets: 16 oz. at Brecon, 17 or 18 oz. at Llandovery, 24 oz. at Caermarthen, &c. &c.: and woe to the dairy-woman who offers, in the market, pounds of less than the customary weight.

sures, have been brought at different times into most of the market towns; but the peasantry has frequently succeeded in driving the foreign invaders into the citadels of the town-halls, and in bringing back their own favourite measures in triumph into the market-places*. Of late, the magistrates have displayed more than usual vigour, and the Winchester measure is becoming more common; especially in the larger towns, and near the coasts.

5. *Land-measure*, owing to its almost infinite varieties, is still more perplexing than the corn measure.

The greatest varieties of provincial acres obtain in the counties of Pembroke and Glamorgan; countries early subjugated by Norman, Flemish, or other foreign invaders; who introduced the *hide* of land (called in Pembrokeshire plough-land), ox-land, forest pole, wood or fen pole, &c. into their respective baronies, knight's-fees, &c.

A plough-land, by which the parochial rates are levied in many parts of Pembrokeshire, consists of eight ox-lands, and each ox-land of eight customary acres, and

* "The same irregularity in weights and measures prevails here, and all over the country, as in other parts of the kingdom. No two places are governed by the same standard, and neither by the legal one. That which has obtained here for measuring corn is called a *strike*, consisting of 16 quarts. Many have been the attempts, at different times, to introduce, nay to enforce the *Winton* measure, but in vain. The hydra-headed prejudice was too powerfull. Neither the persuasive language of reason, or moderation, nor the harsher tone of authority availed. The clerk of the market, with his nicely trimmed measure, was insulted, the magistrate defied; and the old *hereditary strike* was "seen to triumph over the usurping Winchester."—*Mr. Fenton's Statist. Acc. of Fishguard.*

This is the more to be wondered at, as the Fishguard strike is half a Winchester bushel; and the Fishguard bushel is two Winchesters: they differ only in names and divisions.—*D.*

those

those varying almost in every hundred, according to the length of the pole, perch, rod, or bat, adopted in each.

The customary perch, &c. is the basis from which the quantity of each acre is respectively raised; the perch varying from 9 feet to $13\frac{1}{2}$ feet, the ascending denominations, or multipliers, are uniformly the same, excepting in one instance; as will appear by the following statement.

	A.	R.	P.	Yds.
1. 9 feet square to the perch—40 perches 1 quarter, and 4 quarters 1 stangell, being 1440 square yards, or of statute measure	0	1	7	$18\frac{1}{2}$
4 stangell 1 erw, 5760 square yards, or .. This is the customary measure of the hundred of Castle Martin in Pembrokeshire, and of some parts in the west of Glamorgan. This erw is equal to the Cornish acre.	1	0	30	$19\frac{1}{2}$
2. $10\frac{1}{2}$ feet 1 quart—4 quarts 1 llath—40 llath 1 stangell, or 1960 yards, being	0	1	24	24
4 stangell 1 erw, or 7840 yards, being .. This is the customary acre of the hundred of Rhôs (Rowse) in Pembrokeshire: it obtains also, under different denominations in Glamorganshire, in the Vale of Miskin, Llantrisant, &c. where it is thus defined:	1	2	19	$5\frac{1}{2}$
" $10\frac{1}{2}$ troedfedd ir llath, 40 llath, ir cwar- ter, a 4 cwarter ir cyfar, a 4 cyfar ir erw:" amounting, as before, to	1	2	19	$5\frac{1}{2}$
This erw is equal to the Lancashire acre.				
3. 11 feet to the bat $\times 40 \times 4 = 2346$ yards, or 1 stang	0	1	37	$16\frac{1}{2}$
4 stang 1 erw = 9384 yards, or	1	3	30	$8\frac{1}{2}$
This is the customary acre of the hundred of Dau-gleddeu in Pembrokeshire. The perch of 11 feet is that called llath Eglwys Ilan in Glamorganshire, but with the anomaly of computing 48 instead of 40 perches to the rood, by which the erw of Eglwys Ilan amounts to	2	1	12	11
4. $11\frac{1}{2}$ feet to the llath, and 48 llath (as in the last instance) to the quarter, and 4 quarters to the cyvar or small acre, being 2821 yards, or	0	2	13	$7\frac{1}{2}$
And 4 cyvar to the erw, being	2	1	13	$\frac{1}{2}$
This is the customary measure of the north				of

WEIGHTS AND MEASURES.

	A.	R.	P.	Yds.
of Glamorganshire, and is there called <i>erw Ferthyr Tudful, erw Llan Vabon, &c.</i>				
t to the <i>quart</i> , 4 quarts to the <i>llath</i> , 40 } <i>llath</i> 1 'stangell of 2560 yards, or }	0	2	4	19
'stangell 1 erw of 10,240 yards, or }	2	0	18	15½
This is the customary measure in the hun- dreds of Dewi's Land, Kemmaes, and Kilgaron, in Pembrokeshire; the south of Cardiganshire, parts of Caermarthen- shire, and Glamorganshire. In the lat- ter it is called <i>erw Llan Gwng</i> . By par- ers and burners the rod of this measure is called <i>pren wyth</i> . This erw is the same quantity as the Staffordshire acre.				
et 1 quart, and eight score quarts 1 'stang } of 3240 square yards, or }	0	2	27	3½
This 'stang is three-fourths of the erw of Howel Dda in the Welsh laws published by Dr. Wotton. This rod in paring and burning is called <i>pren naw</i> , for the same reason as the 12 feet rod is called <i>pren wyth</i> . This 'stang of Powys land and the north of Cardiganshire, is the same quantity as the <i>cyvar</i> of Anglesey and Caernarvonshire—the <i>cyvar</i> or <i>plough- acre</i> of Radnorshire—and of Brecknock- shire to the southern extremity of the Vale of Usk, where the measures Nos. 2 and 4 are in common use. We are				

	R. P.	Yds.
The <i>cyvar Merthyr Tudful</i> , (No. 4)	2 13	7½
The Roman <i>jugerum</i>	2 18	27½
Had the Roman and English foot been equal, the } <i>jugerum</i> would have been	2 25	23½
The <i>cyvar Brycheiniog</i> , &c. (No. 6)	2 27	3½
The <i>stang</i> of Dau-gleddeu in Pembrokeshire (3), is	1 37	16½
Taking the <i>jugerum</i> at 28,800 Roman feet, and re- ducing them into Welsh feet of 9 inches Eng- lish, the <i>jugerum</i> would have been nearly equal, or	1 39	10½

By doubling the length of the perch or rod, as given above in the measures numbered 1, 2, 3, 5, (No. 4 being anomalous), then squaring it, and multiplying the product by 160, according to the rule of calculating the statute acre; the quantity of each erw will be the same as stated above.

No.	Feet in the Perch.	Square Yards in the Acre.	
1. 18	5760	= to the Cornish acre.
2. 21	7840	Lancashire, and the Irish plantation acre.
3. 22	9384	
5. 24	10,240	Staffordshire acre.
6. 27	12,960	This erw is not now in use in Wales.
	16½	4840	Statute acre.

In some parishes there are no less than *three* several land measures in use: this, with a similar variety of corn measure, precludes, in a great degree, the attainment of information as to quantity of seed sown per acre, or the produce thereof. A stranger, in asking such questions, will not be more edified, in many parts of South Wales, than if his enquiries had been made in any part of Africa.

The “*chain* acre”—the “*cyvar y Brenin*” (the King’s

WEIGHTS AND MEASURES.

ough acre), as the statute measure is called by non farmers, is, however, coming gradually into use: most of the tenantry take their farms by Agricultural Societies regulate their premiums and most gentlemen set task-work, mowing and by it; as well as thrashing by the Winchester

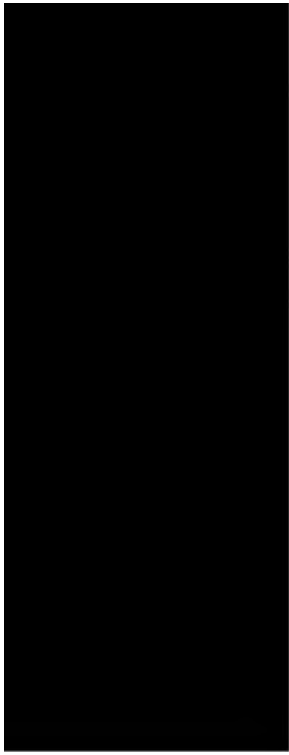
perch or rod (erroneously termed *rood* in some places) whereby labourers perform task-work, in making, draining, fencing, &c., is 6 yards in the north of Lancashire; in other places, Brecknockshire, &c. in Cardiganshire 8 yards, which is the measure adopted by the Agricultural Societies in general.

CONCLUSION,**MEANS OF IMPROVEMENT,**

AND THE MEASURES CALCULATED FOR THAT PURPOSE.

WITH respect to the means of improvement, they are suggested in the foregoing Chapters, under the several heads of which they are composed.

APPENDIX.



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Plan of the CARDIGANSHIRE MINES.

No. I.



APPENDIX.

No. I.

Some further Account of the Cardiganshire Mines, beginning north on the Dovey, and ending south on the Towy.

THE annexed Plan, shews the relative situations of the Mines, as promised in vol. I. p. 91. The veins bear east and west, excepting Nos. 2, 17, 18, and perhaps one or two more, which run from north to south. They are all imbedded either in argillaceous schist or the grey mountain rock: the matrix is chiefly quartz, and not unfrequently with mixtures of blend. The line might be extended northward, through the counties of Meirionydd and Caernarvon, to the Irish Sea; but southward it is cut off by the transverse strata of the red sandstone tract.

No. 1. *Cefn Maesmor*—some copper was discovered here about 30 years back: some ineffectual trials were made then, and six or seven years since, without success.—See vol. I. p. 91.

2. *Esgair Vraith*—copper ore was discovered here in 1693. Some few hundred pounds worth of ore was raised so late as from 1773 to 1791.

3. *Egair Hir*—the Welsh *Potosi* of the maps—discovered in 1690—very rich in lead ore for several years—from the year 1750 onward, several thousands of pounds have been expended by different adventurers.—See vol. I. p. 88.

4. *Ynys*

APPENDIX.

nyys Hir—lead ore—once a rich mine.

re'r Ddol—lead ore.

nyys Cynroelyn—lead ore, with some copper;
by Mr. Job Sheldon.

allt y Crág, or Tal y Bont—lead ore, worked
Bushel in the reign of Charles I.—afterwards by
Mackworth; and since the year 1750 by the Sa-
pany.

oel Goch—lead ore—an old mine; and worked
alop Company about the year 1750.

en y Bank—lead ore, with sulphat of zinc;
by Mr. Sheldon.

urglawdd—lead ore, with some copper; work-
by Mr. Sheldon.

y Nant—lead ore.

Ienfælch—lead ore; an old mine, worked by
ldon.

winllan—lead ore.

and which continued at nearly the same thickness for a considerable space. One of the most regular and most durable of these, was a rib of steel-grained lead ore at *Darren Vawr*, in Cardiganshire; where I saw between twenty and thirty miners in a row, one before another, stoping upon the low soles, about 50 fathoms down below the surface; besides as many, or more, who were sumping, driving, and roofing in other parts of the work upon the same vein; and a great many more were at the same time working upon a string which struck off with an acute angle from the principal vein; and as the soles of the string were nearly upon a level with the soles of the vein, both sets of miners were visible from the same spot. This fine rib of ore was generally about three feet wide, both in the vein and string; though in some places it was not above two feet, and in others near four feet wide.

"Steel-grained lead ore is generally rich in silver; and this at *Darren Vawr* was remarkably so; the produce in silver being very great."—*Min. Kingd.* I. 277, orig. edit.

This mine has been added to the *Gogerddan* property by purchase: its last explorer was Mr. Sheldon.

18. *Darren Vach*—lead ore. This name has been adopted as a distinction of property: in other respects, it is a continuation of the *Darren Vawr* vein; being one of the few veins in Cardiganshire which run north and south. This mine belonged to *Gogerddan* from time immemorial.

19. *Hillocks of rubbish* (in view of the *Aberystwyth* road to *Tal y Bont*) where trials have been made to discover the continuation of the *Cwm Symlog* vein (No. 20) in its progress westward: but it seems probable that the *Cwm Symlog* vein is entirely cut off
by

by the transverse vein of Darren Vawr and Darren Vach (Nos. 17, 18).

20. *Cwm Symlog*—lead ore, the second in Wales in produce of silver; yielding about 60 ounces per ton of lead. This ore in 1806 sold for 22*l.* per ton. This mine, according to Fuller, was opened by Customer Smith, in the reign of Elizabeth, who sent the silver to be coined at the Tower of London. Afterwards Sir Hugh Myddelton worked it with great profit, and by its means brought the New River to London. After Sir Hugh's death, it was worked by Sir Francis Godolphin, and Mr. Bushel. The latter, at length, deserted Cwm Symlog, and entered upon five fresh mines, viz. Tal y Bont, Darren, Bryn llwyd, Goginan, and Cwm Ervin.

From 1750 to 1770 Cwm Symlog mine yielded good profit: it was neglected from 1770 to 1805, and from that date to the present it yields profit.

21. *Goginan*—lead ore—worked by Mr. Bushel; and at present by Mr. Sheldon. The ore yields 12½ cwt. of lead per ton, and 35 ounces of silver per ton of lead. This property was purchased by the Gogerddan family about the year 1760.

22. *Pen Craig Ddu*—lead ore—worked in the year 1744, &c.

23. *Llywernog*—lead ore, and blend: here are two mines on separate properties; one on the Nant Eos estate, discovered about 44 years back; the other lately opened on the Gogerddan property. A water-wheel has been erected about five years ago to drain this mine.

24. *Ceunant*—lead ore.

25. *Cwm Ervin*—lead ore; one of the five mines worked by Mr. Bushel after his quitting Cwm Symlog: quantity

quantity of lead and silver per ton of ore, nearly equal to that of *Darren Vawr*. This mine was worked by Mr. Lewis Morris. In a letter to his brother at the Navy Office, in the year 1760, he says—"I begin to clear *Cwm Ervin* again, in hopes of a peace—*Rhwng Ned Huws feddw feddal, a Jack Owen ddifeddwl*—*Cwm Ervin* has been hundreds of pounds out of my way. *Goginan* is to be sold: I am anxious to have it. *Mi wn fod mwyn iw gael yno, ped fai eiddo fi*: it is as rich ore as any in the county, and just at the door of my house." *Cwm Ervin* mine is the property of Mr. Wm. Jones of *Cwm Rheidiol*: it has not been worked since 1795, until of late.

26. *Gelli Eirin*—lead ore, belonging to G. Bon-sall, Esq.

27. *Dyffryn Melindwr*—lead ore.

28. *Ystum Tien*—lead ore; an old mine, granted by the Crown to the Nant Eos family.

29. *Nant y Meirch*—sulphat of zinc, discovered about 1700, by Mr. James Lowe of *Dol y Gors*; granted by the Crown to the Earl of Powis; now worked by Mr. Sheldon.

30. *Dyffryn Castell*—sulphat of zinc; but not much worked hitherto: the texture of the rocks hereabout are enticing in the eye of a miner.

31. *Yr Ochr Llwyd*—lead ore. "*Bromsfloyd*," according to Fuller, was one of the mines worked by Mr. Bushel in the reign of Ch. 1. *Bryn llwyd* was worked by a Flintshire Company in 1744. A fresh string of ore, one foot wide, discovered there in Mr. Lewis Morris's time.

32. *Rhith Regoes*—sulphat of zinc, and some lead; an old mine, belonging to Owen Lloyd, Esq. of *Aber-trinant*.

APPENDIX.

Nant yr Hudol (Rheidiol q.)—lead ore “crop-
the day, on the north of a cliff.”—*L. M.*

Nant y Creiriau—lead ore, and sulphat of
under water.

Llewyn Unhwch—lead ore, and sulphat of zinc,
red on the Crosswood estate about 15 years back,
sed to J. Probert, Esq.

Groau Gwynion—lead ore; an ancient mine:
ort of it called *Gwaith Mawr*, was worked in
by *Ball and Co.* It was then on the decline,
00 yards deep, and 40 yards under level. The
end of the vein belongs to Crosswood, and the
end to Gogerddan; and both have been leased
Probert.

Gwaith Coch—lead ore, and sulphat of zinc—
uation of the vein No. 36, on the declivity of
rock. “This is a good situation, and may
a work of great profit.” *L. M.* in 1756.—This
as leased by the Crosswood family to Mr. Pro-
bout 1798.

Ynghwm Ystwyth *Ed. Lhuyd*: called in the Crown Grant, "*Magna petra, alias Craggie Moyné.*"

"This mine work is not above 100 yards in length, and is a knot of several veins joined together. This small spot has been worked for many ages, and is not yet exhausted. The ore lies in bellies, within great riders, and never in a regular vein."—*L. M.* in 1756.

"Lead, copper, and other ores, are found in the composition of the solid body of the rock in many places. I saw a stupendous rock at *Cwm Ystwyth* in Cardiganshire, where so much lead ore was found blended in the rocks, as to be worth working and separating from the rock. This rock at *Cwm Ystwyth* is of great height, and I saw miners there suspended in ropes, blasting down the rocks with gunpowder, and a number of busy hands breaking the compounded stone and ore small, in order to get the ore separated by washing and dressing. I believe it always happens, that when ore is found blended in the composition of the solid rock, any joints and fissures found in such rocks, generally contain ore. This was the case at *Cwm Ystwyth*. They had been working some veins and strings long before I was there; and they were then going on with some of them; but it was the working away the solid rock that struck my attention most. This part of the work was extensive; and in several places they had cut down the rock so as to have very good footing for standing to work. It is so long since I saw this singular work, that I do not now remember certainly of what species the rocks at *Cwm Ystwyth* are; but I still retain an imperfect idea that they are limestone."—*Williams's Min. Kingd.* I. 358, orig. edit.

For the good of Cardiganshire, and the adjoining
counties,

counties, it were to be wished that this author's recollection had been more correct. The rock at Cwm Ystwyth is a confused assemblage of argillaceous schist, irregularly dipping in all directions; with here and there, masses of grey mountain rock (*carreg lwyd y rhych*). In some of the strings, veins, or bellies, the ore has the usual matrix of quartz, mixed with sulphat of zinc.

The late Sir Tho. Bonsall worked this mine, with considerable profit, from 1770 to 1790, under a lease from the Nant Eos family, who are the grantees of the Crown. It is now worked for the grantee, under the direction of Mr. Marsden. In 1813, pumps were discovered in the old works, supposed by their appearance to have been deposited there two centuries back.

42. *Copper-Hill*.—"A great quantity of copper ore hath been raised here in former times; but there is no great work carried on at present."—*Mr. L. M.* 1756.

In 1813, stones different from any in the neighbourhood, were found in the old levels; round, and of a tough quality, and supposed by the present race of miners to have been used for hand-mallets, before the use of pick-axes.

43. A soft schistose rock, with some lead ore; leased by the Crown, with Esgair y Mwym (No. 40) to the Earl of Powis.

44. *Cwm Elain*, in Radnorshire—lead ore, and sulphat of zinc. See vol. I. p. 78.

45. *Cwm y Graig Goch*—lead ore raised here formerly.

46. *Rhysgog*—lead ore, steel-grained and tessellated, in a matrix of quartz and sulphat of zinc; an old work, deserted upwards of 30 years back.

47. *Esgair Gadwach*—ores, &c. as the last, being appa-

apparently the same vein, discovered about 40 years back, and worked for 10 or 12 years.

48. *Cwm Robert*—lead ore; only a small trial was made here about 14 years ago, and given up.

These three last are on the waste in the manor of Llan Ddewi Brevi, belonging to the Bishop of St. David's for the time being.

49. *Mynydd bach*—lead ore, yielding silver; with some copper ore; discovered about 16 years back; but not hitherto sufficiently explored.

50. *Llan Vair y Clywedogau* (St. Mary's, on the united stream of three brooks, each called *Clywedog*, audible, sonorous, &c.)—potters' lead ore—one ton yielding 12 cwt. of lead; and one ton of lead 87 ounces of silver, equal to 52 ounces of silver from each ton of ore: which is said to be richer in silver than any ore in Britain, excepting one near Plymouth. The vein was discovered some years since in the bed of the *Clywedog*, near its junction with the *Teivy*. It was worked by Mr. Townsend of Swansea, previous to the year 1777; and afterwards by a Mr. Hodges of Monmouthshire. The bearing of the vein is from N.W. to S.E. hading to the N. E. in a schistose rock bearing E. and W.

This mine is now worked to the depth of 60 yards, by the aid of a water wheel 24 feet high, and 38 inches upon the sole, said, in the technical phrase, to be of 25 horse-power.

51. *Tan y Gaer*—lead ore, discovered in 1807.

52. *Vuchdre*—lead ore, discovered in 1806.

53. *Rhandir y Mwyn*—a profitable lead mine, belonging to Lord Cawdor. See vol. I. p. 79.

54. *Cynwyl Gaiu*.—See vol. I. p. 92.

Here, we believe, end the metallic ores of the slate

APPENDIX.

e tract, bearing in a north and south direc-
n the Dovey to the Towy: south of the Towy,
sandstone strata forbid any sanguine expecta-
ores. South of the red sandstone and coal
he limestone ores are found; but not in the
nor the regularity of those of the slate tract,

No. II.

Extract of a Letter from the Rev. THOMAS ALBAN, of Ludlow, to D. E. LEWIS LLOYD, Esq. of 1961 Haidd, on the feasibility and utility of planting Orchards in Cardiganshire.

THE scarcity of fruits throughout the county of Cardigan, and what delightful salubrious acquisition they would be, all readily admit; and considering the number of the patriotic, opulent, and well-informed land-owners residing in every part, a stranger might conclude that there must be some physical cause, some insurmountable obstacle, either in the soil or climate, sternly prohibiting every attempt to plant fruit trees. Recollection of former days, and observation of later years, concur in deprecating such an idea as unworthy my native soil: within my memory, considerable quantities of fruit were to be found in many parts, where not even a vestige now remains, except the name, "*Y Berllan*." To secure a succession of fruit trees, there should be planters in every age: for want of planters in Cardiganshire for the last 80 or 100 years, fruit is become so extremely scarce and valuable, that none will now plant with any hope of *preserving*: the fruit is stolen even before ripe, and the trees, dreadfully torn by depredators, exhibiting so mortifying a sight, that the few remaining orchards have been cut down; and planting more is become hopeless. To remove this great evil, some general measure should be adopted; and the plan I propose is, to restore to the whole county of Cardigan what it once possessed, *abundance of fruit*: its climate is milder and more

equal than many counties abounding with fruit. In Herefordshire we find that the hills, and even northerly aspects, are more apt to bear than the valley and warm south aspects: in the latter, the heat of the sun at mid-day in the spring (April especially), sets the sap in circulation; and the coldness of the night air, rendered more chilly by the vapours exhaled by the heat than on the hills, suddenly checks the circulation: its regular current being so stopped, the blossoms fall and drop off, and the sap becomes viscid and sweet; and deprived of its bitterness, is food for the insects, aphides, which increase most rapidly until the leaves are all consumed; the climate of most parts of Cardiganshire is, I am satisfied, better adapted to secure a regular bearing—crops of fruit—than even the most favoured county in England—Hereford: for the truth of this, I appeal to those gentlemen residing in different parts of my native county, (now having apple trees in their gardens, although much judgment may not have been displayed in the selection of the varieties most proper)—have they not good crops once in every *three* years? If they have, it is more than Herefordshire can boast of, where for the last thirty years, we have not had more than three good crops; this fact proves more than volumes of speculative theories, and ought to remove every doubt from the minds of my countrymen, and stimulate them to exertions worthy the descendants of a respectable and patriotic ancestry.

In those acquainted with Cardiganshire, it would be the utmost stretch of scepticism to doubt the fertility of its soil: I am persuaded that there is not a parish in the whole county, abounding as it does with valleys and beautiful dingles, where apple trees will not grow, flourish, and bear; and not many parishes, where most farms

farms and cottages do not present sheltered, fertile spots: the numerous rivulets traversing the county in all directions, from the summits of the highest hills to its long extended sea-shore, invite the industrious planter to situations well adapted to the pursuit of his favourite amusement, with certainty of success. The apple tree will flourish in the same soil as the oak: are there many parts of Cardiganshire where oak trees are not recollected? It has been said, that the oak will not now thrive where it formerly did: why? because the plantations are not at first made sufficiently thick, and afterwards properly thinned: young trees, of all sorts, must be planted thick; sheltering one another, even in the well-wooded flats of Herefordshire; and so must our orchards: I cannot expect an apple tree to thrive in exposed situations, where other trees would be stunted, and fail.

Having now removed, I hope to your satisfaction, the two great objections to planting fruit trees, and convinced those, who insist on the inaptitude of the climate or infertility of the soil of my native county for producing flourishing orchards, I beg leave to submit to your consideration the mode that appears to me best calculated to accomplish the grand desideratum: the evil being co-extensive with the county, the remedy should be equally so: few dispersed individuals, of even powerful influence, cannot effectuate much: there must be a co-operation of the gentlemen residing in every part; and the Agricultural Society is well qualified to give it so general an effect: with the finances of that laudable institution I am unacquainted: if its funds are but adequate to promote its present objects, another subscription may be entered into, expressly to promote planting fruit trees: concluding that the patriotic spirit of
my

my countrymen will, at all events, provide adequate funds, I proceed to detail my plan.

There should be from ten to twelve nurseries established in different parts of the county, distant from each other about six miles: spots of ground, about two acres each, not too much exposed, rather rich, should be selected: in every part of the county there are gentlemen residing, who, I am persuaded, would not only accommodate the Society at a fair rent with such a piece of land, but also superintend the management of the nursery, a circumstance of the highest importance to its future success and prosperity: the piece of land so selected must be *well* enclosed, and dug two spades (15 or 18 inches) deep, and set the first year with potatoes, well worked; the following October, seedlings of one or two years old (the latter best) of all sorts of fruit trees, should be procured (apples, pears, plums, and cherries); those may be had in any quantity from the nurserymen, at about 7*s.* 6*d.* per 1000: 60,000 would cost, carriage included, about 25*l.*; a sum too small to merit consideration. To every nursery, at least, 3000 apple and 1000 pear trees should be allotted, and planted without delay; also about 1000 other seedling fruit trees, plums, and cherries; besides a large quantity of cuttings of gooseberries and currants. I recommend the rows to be full a yard distant from each other, and the trees two or three feet distant in the row. An acre so planted will take 5000 trees; the failures from various causes may reduce them to 4500 strong, healthy, vigorous trees, fit to be planted out; the rest of the ground enclosed, if any remain, may be planted with seedling quicks, oak, larch, &c.

The whole of this operation will not occupy much time,

time, and the expense will be trifling: the nurseries should be kept clean, and hoed (two or three inches deep) thrice in every year, and in the second and third years the lowest lateral branches should be pruned or taken off: this is the whole work required for those first three years: on the fourth and fifth the trees should all be grafted: in the selection of fruits for that purpose, some judgment will be required: as a general rule, I should prefer taking grafts from healthy trees, of the best sorts in the neighbourhood, known to be apt to bear, *quantity* being the first requisite: uniting *quality* with *quantity* would be very desirable; but although common sense and experience assure that the same variety of the apple is not calculated for the clay and the sand, for the warm and exposed situations, yet we know not which variety is best fitted for either. In the introduction of such an expensive plan, speculation should be avoided, and *quantity* secured, leaving to further experience and observation, to discover richer and better fruits that may be safely recommended and adopted. On this subject I may hereafter be able to furnish few more hints. The trees so grafted should remain in the nurseries from five to eight years, receiving no further attention, except keeping the ground clean and worked, and rubbing off the shoots growing on the stocks below the grafts, and training the trees to about four or five feet high. In Herefordshire they are "trimmed up" six or seven feet; but such a height would too much expose them to the wind, in Cardiganshire. The nurseries being now about twelve years old, all the trees will be fit to be planted out; a period that appears as short to the planter, as so many years past do to others: he is so disinterested, that he seldom calculates upon reaping himself

APPENDIX.

upon the quantity purchased, and the prices:
one half to be *given* away, and the other
at 1s. each, a very moderate price, a fund
for the discharging of the two first sixpenny pre-
would be raised.

If these hints so far meet with your approba-
tion you feel inclined to submit them to the con-
sideration of the Members of the Agricultural Society,
at liberty to lay them before them in whatever
you may deem most advisable.

T. A.

Per, Aug. 24, 1812.

INDEX.

- ABELE, i. 227, 274.
 Aberthaw tarras, i. 57.
 Acres in South Wales, i. 2; ii. 70, 479.
 — provincial, ii. 503.
 Aftermath, i. 549, 575.
 Agents of Estates, i. 120; ii. 483.
 Agent of motion, i. 468.
 Agricultural Societies, i. 41; ii. 85, 367, 472, 487.
 Alder, i. 243; ii. 21.
 Algae, ii. 150.
 Alabaster, i. 60, 154.
 Alteration of crops, i. 306, 372.
 Analysis of limestone, i. 46, 50.
 — of mineral waters, i. 113, 116.
 Angle in ploughing, i. 277.
 — in pleaching, i. 246.
 Animalculæ, ii. 397, 399.
 Animal food, ii. 294.
 Anomalies of the slate tract, i. 30.
 Anomalous limestone, i. 55.
 — sandstone, i. 53.
 — red soil, i. 55.
 — freestone, i. 146.
 Aphides, i. 397.
 Apples, ii. 5, App. II.
 Application of lime, ii. 174.
 Aqueduct, Roman, i. 92.
 Arable land, i. 276.
 Arbutus, i. 12.
 Arched roofs, i. 155.
 Arches, natural, i. 64.
 Artificers, i. 182.
 Arundo Arenaria, i. 261.
 Ash, i. 242; ii. 21, 58.
 Ashes, ii. 193.
 Aspect, i. 11, 19.
 Aspine, i. 243.
 Axle trees, i. 206.
 Barberry, i. 228.
 Barley, i. 350, 451.
 — tract, i. 14, 34, 351, 377.
 — soil, i. 409.
 Bassetting, i. 67; ii. 360.
 Bay trees, ii. 31.
 Beans, i. 337, 340, 499.
 Bearing of strata, i. 30, 48; ii. 329.
 Beds of rivers, i. 107.
 Beech, i. 242; ii. 22, 59.
 Bees, ii. 282.
 Benefactions, ii. 473.
 Binding corn, i. 431.
 Binding coal, ii. 334.
 Birch, i. 244; ii. 56.
 Bird, cherry, i. 233; ii. 61.
 Bitumen, i. 50, 67; ii. 335, 337.
 Black jack, i. 72, 93; App. I.
 — thorn, i. 224.
 Blight, i. 393.
 Bloomeries, ii. 448.
 Bolting Mills, i. 465.
 Cook farmers, i. 180.
 Box, i. 239.

Brass.

INDEX.

- Climate, i. 10, 69, 483; ii. 480.
- Clunch, i. 66, 73; ii. 337.
- Clover, i. 453, 575.
- Coaking peat, ii. 321.
- coal, ii. 336.
- Coal, ii. 322.
- Coal tract, i. 66; ii. 329.
- Cock-chaffer, i. 42, 515; ii. 140.
- Coinage of silver, i. 84, 86.
- Construction of ploughs, i. 191, 197.
- of wheels, i. 211.
- Commerce, ii. 418.
- Consumption of corn, i. 480.
- of coal, ii. 350, 457.
- Convolvulus, i. 241, 421.
- Copper ores, i. 71, 91.
- works, ii. 465.
- mines, App. I.
- slag, i. 151, 262.
- Copious springs, i. 109.
- Copyholds, i. 121.
- Corn staddles, i. 156.

- Cyder, ii. 5.
 Cylindrical wheels, i. 211.
 Dairy, ii. 221, 414, 499.
 Danish mining, i. 81.
 Denudation, i. 125.
 Depth of furrow, i. 282.
 Dibbling quicks, i. 253.
 Dimetian cottages, i. 144.
 — ploughs, i. 187.
 — teams, i. 291.
 Dinas rock, i. 48.
 Diseases of wheat, i. 394.
 — of sheep, ii. 257, 272.
 — of horses, ii. 279.
 Dispensaries, ii. 470.
 Dock, i. 559.
 Dogberry, i. 228.
 Dorsal cars, i. 205.
 Draining, ii. 118.
 Dressing hay grounds, i. 559.
 Drilling, i. 13, 412, 521.
 Dung manure, i. 384, 397; ii. 141, 146.
 — carts, i. 211.
 Duty on bricks, &c. i. 124.
 Early sowing, i. 317, 418.
 — harvests, i. 423.
 Ebbing springs, i. 108.
 Ebulo, i. 227.
 Eglantine, i. 241.
 Elder, i. 227; ii. 56, 61, 62.
 Eligus, i. 64.
 Elm, i. 242; ii. 23, 53, 58.
 Encroachments, ii. 69.
 Entry on farms, i. 177.
 Eppynt hills, i. 28, 37, 248; ii. 81.
 Estates, i. 119.
 Evergreen shelter, ii. 14.
 Exotics, i. 12, 409.
 Expenses of Roads, ii. 377.
 Exports, i. 480; ii. 418.
 Extra parochial, i. 9.
 Exuviae, i. 45, 47, 52, 63, 75.
 Failure of clover, i. 582.
 Fall of the leaf, i. 267.
 Fairs, ii. 411.
 Fallowing, i. 294, 310, 333.
 Farewell Rocks, i. 67; ii. 356.
 Farms, i. 162.
 Farm buildings, i. 126.
 — yards, i. 129, 130.
 Farmers, i. 178.
 Farriers, ii. 280.
 Faults in mines, ii. 332.
 Feeding land, ii. 539.
 — wheat crops, i. 422.
 Fences, i. 219; ii. 287.
 — in sea air, i. 259, 261, 263.
 — on river sides, i. 269.
 Felting wool, ii. 267.
 Fens (*cars*), ii. 88, 138, 317.
 Fern, i. 142; ii. 315.
 Ferny soil, i. 346, 423; ii. 114.
 Field stones, 34; ii. 380.
 — mows, i. 432.
 Fiorin, i. 586; ii. 83, 128.
 Fire clay, i. 73; ii. 357, 446.
 Firs, ii. 27, 64.
 Fish, i. 98; ii. 295.
 Flail thrashing, i. 439; ii. 235, 472.
 Flax, i. 532; ii. 447.
 Flint strings, i. 55.
 Flemish cottages, i. 143.
 Floors, i. 158, 442.
 Fly in turnips, i. 515.
 Foddering in fields, i. 157, 571, 610.
 — cribs, i. 156.
 Fogs, or mists, i. 25.
 Fog pastures, i. 544.
 Folding,

Galena, or potters' ore, i. 71, 76;

App. I.

Gardens, ii. 1.

Gates, i. 272.

Gavel-kind, ii. 482.

General inclosure, ii. 104.

Glamorgan cottages, i. 197.

Gleaning, i. 428.

Granaries, i. 480, 494.

Grass land, i. 528.

Laying down in grass, i. 575, 600.

Grass, natural, i. 12, 13, &c. 521,
606, 612.

Grass plats, i. 604.

Green crops, i. 495.

Gypseous alabaster, i. 60, 154.

Gypsum manure, i. 60; ii. 166.

Hafod plantations, ii. 33, 45, 48.

Haddocks in fields, i. 432.

Hand-reaping, i. 140, 183, 425, 428.

Hand-set quicks, i. 253.

Hardy trees, i. 268; ii. 54, 56.

Harrow, i. 201.

- Juniper, i. 239.
 Ivy, i. 242.
 Kemps in wool, i. 43; ii. 248, 253.
 Kilns for burning lime, ii. 169.
 — for drying corn, i. 470.
 ————— seed corn, i. 350,
 406.
 Kitchen gardens, ii. 1.
 Knapweed, i. 560.
 Labourers, i. 135, 183; ii. 283, 313.
 Laburnum, ii. 61.
 Lakes, i. 117.
 Land measure, ii. 502.
 Landlords and tenants, i. 181; ii.
 483.
 Lapis cariosus, i. 60, 94.
 Larch, i. 528; ii. 57.
 Late sowing, i. 300, 419, 420.)
 Laver, ii. 810.
 Lawn Grasses, i. 604.
 Laws (poor), ii. 474.
 Laying down for grass, 600.
 Lead ore, ii. 54, 71, 76; ii. 319;
 App. I.
 Leather, ii. 444.
 Leases, i. 135, 166, 328; ii. 34.
 Leeks, ii. 3.
 Levels in coal mines, ii. 348.
 Ley crops, i. 334, 348.
 Lias limestone, i. 53, 57.
 Limestone, i. 44.
 Lime manure, i. 57, 250, 299, 310,
 &c. 384; ii. 167, 481.
 — for poor soils in quick fencing,
 i. 250.
 Lime measures, ii. 171.
 Lime tree, i. 245.
 Liming rivers, ii. 309.
 Linden tree, i. 245; ii. 92.
 Live stock, i. 361; ii. 206.
 Loading corn and hay, i. 434.
 Longevity, i. 11, 132.
 Long-lacing, i. 285; ii. 135.
 Lopping trees, ii. 46, 47.
 Lucern, i. 594.
 Machines, i. 214, 439, 468.
 Mail coaches, ii. 369.
 Management of estates, i. 110; ii.
 484.
 Manganese, i. 54, 94.
 Mangel wurzel, i. 531.
 Manufactures, ii. 319, 438, 489.
 Manures, i. 810; ii. 140.
 Maple, i. 243; ii. 22, 56.
 Marble, i. 53, 163.
 Margam, i. 261, 263; ii. 15, 29.
 Markets, i. 480; ii. 415, 433.
 Marl, i. 32; ii. 152.
 Marl grass, i. 585.
 Marsh land, i. 51, 261.
 Materials for building, i. 124, 145.
 ————— for roads, ii. 378.
 Masonry, i. 423, 126; ii. 389.
 Matweed. See *Arundo*.
 Meadows, i. 551.
 Meals, ii. 311.
 Measures, ii. 171, 499.
 Medicinal springs, i. 111.
 Merthyr Tudful, i. 15; ii. 458.
 Metallic ores, i. 71; App. I.
 ————— scoria, ii. 448.
 ————— manufactures, ii. 448.
 Meteorology, i. 16, 21.
 Micaceous slate, i. 40, 152.
 Mildew, i. 389, 393.
 Milford Haven, i. 96; ii. 423.
 Mills, i. 465.
 Millstone strata, i. 62; ii. 356.
 Minerals, i. 71; App. I.
 Mineral springs, i. 111.
 M m 2 Mineral

INDEX.

- hire, App. I.
- n, i. 161.
- i. 280.
- 187.
- 317.
- i. 134.
- 90, 196.
- 45, 39; ii. 71, 74.
- 519; ii. 57, 243.
- 83.
- 82.
- 4.
- 13, 330, 521,
- 420.
- Ornamental materials, i. 153.
- Osier willow, i. 240.
- Out-buildings, i. 126.
- Out-lying stock, i. 156, 571 610.
- Ovens, i. 149.
- Ox teams, i. 290.
- Oysters, ii. 306.
- Paper manufacture, ii. 447.
- Parasitical plants, i. 241.
- Paring and burning, i. 346, 368, 480; ii. 132.
- Parochial rates, ii. 471.
- Parks and lawns, i. 604; ii. 53.
- Pastures, i. 538.
- Patron saints, i. 117.
- Pearl barley, i. 455.
- Pease, i. 372, 495.
- Peat, i. 33; ii. 89, 122, 164, 193, 316.
- Per centage on buildings, i. 132, 174.
- Perpetual leases, i. 170.
- crops, i. 354.
- Pickling seed, i. 403.

- Potatoes, i. 370, 504; ii. 292.
 Poultry, ii. 282.
 Pottery, ii. 445.
 Pouzzolana, i. 57.
 Price of land, i. 163.
 — of lime, ii. 179, 180.
 — of coal, ii. 353.
 — of labour, ii. 284.
 — of thatching, i. 141.
 — of ploughs, i. 195.
 — of paring and burning, ii. 138.
 Primitive limestone, i. 47; ii. 356.
 Privet, ii. 228.
 Produce of crops, i. 310, 445, 460, 478, 511.
 Projection of stacks, i. 438.
 Proprietors of estates, i. 178.
 — of woods, ii. 252.
 Provisions, i. 387; ii. 291.
 Pruning fences, i. 247, 255.
 — forest trees. See *Lopping*.
 Puddingstone, i. 67; ii. 203, 355.
 Puffins, i. 64.
 Purbeck freestone, i. 61.

 Quality of servants, ii. 289.
 — of peat water, ii. 318.
 Quantity sown per acre, i. 412, 456, 478, 498, 577.
 — of lime per acre, ii. 178.
 — of coal in South Wales, ii. 350.
 Quartz, i. 78, 95; App. I.
 Quack medicines, i. 393, 401.
 Quick fences, i. 224, 249.
 Quickset (Welsh), i. 250.
 Quitting of farms, i. 177.

 Racks for foddering, i. 156.
 Rail roads, ii. 374, 383, 399, 401.
 Rakes, Glamorgan, i. 216.

 Rain, i. 12, 17.
 Rape, i. 530.
 Raspberry, i. 239.
 Rath-ripe barley, i. 454.
 Ray-grass, i. 588.
 Reaping, i. 140, 183, 424; ii. 286.
 Recurrent springs, i. 108.
 Red sandstone tract, i. 36.
 — soil of Pembrokeshire, i. 56.
 — earth of Glamorgan, i. 60.
 — crake, i. 232.
 Refining mills, i. 87.
 Removal of tenants, i. 177.
 Rent, i. 163.
 Repairs, i. 173.
 — of roads, ii. 381.
 Restrictions in tillage, i. 372.
 Returns. See *Produce*.
 Ricks of corn. See *Stacks*.
 Ridges, breadth of, i. 287.
 Right of property, i. 185.
 Rime, i. 13.
 Ripeness of crops, i. 459.
 Rivers, i. 33, 96.
 — fences on, i. 269.
 Roads, i. 69, 206; ii. 366, 481.
 Road ploughs, i. 201; ii. 370.
 Roan in barley, i. 460.
 Rolling, i. 421, 458, 518.
 Roman masonry, i. 126.
 — mining, i. 81.
 — jugerum, ii. 504.
 Roofing materials, i. 40, 151; ii. 446.
 Rooks, i. 42, 519.
 Rotherham ploughs, i. 187.
 Rotten stone. See *Lapis carbonis*.
 Rouen, i. 549.
 Rural artificers, i. 182.
 — economy, ii. 283.
 Rushes, i. 148.

INDEX.

- 527.
- 179; ii. 115.
- , i. 112, 116.
- i. 260; ii. 90
- 8.
- 3.
- i. 261.
- ct, i. 36.
- ers on limestone, i. 55.
- 92; ii. 123.
- 310.
- ce, i. 117.
- dings, i. 124.
- ic, i. 151; ii. 448.
- 3, 426, 562.
- , 52, 96; ii. 295.
- 9; ii. 64.
- i. 259.
- ure, i. 359; ii. 162.
- coal, i. 66.
- Silurian teams, i. 291.
- Single-horse carts, i. 208.
- ploughs, i. 190.
- Size of farms, i. 162.
- of stacks, i. 438.
- Slaking of lime, ii. 175.
- Slate tract, i. 28.
- for roofing, i. 40, 152; ii. 446
- pencils, i. 95.
- Slug in turnips, i. 515.
- Smelting houses, i. 87; ii. 465
- Smut in corn, i. 393.
- Spades, i. 216.
- Spindle tree, i. 228.
- Spruce firs, ii. 64.
- Spearing of fish, ii. 309.
- Spontaneous swarding, i. 607
- Springs of water, i. 108.
- Spring wheat, i. 345, 389.
- Spurge laurel and olive, i. 232.
- Snow. See *Climate*.
- Societies, Friendly, &c. ii. 466.

- Swing ploughs, i. 187.
 Swiving mode of reaping, i. 425.
 Sycamore, i. 243; ii. 56.
 Systems of husbandry, i. 306, 375.
- Tanning in peat moss, ii. 318.
 Tang. See *Alga*.
 Tarras lime, i. 57.
 Task-work, ii. 286.
 Tax on Coal, i. 124; ii. 481.
 Teams, i. 289.
 Teil tree. Vide *Linden*.
 Temperature, i. 15.
 Tenants, i. 165.
 Tenures, i. 120.
 Thatching, i. 140, 183.
 Thermal springs, i. 111.
 Thrashing floors, i. 129, 442.
 ——— portable, i. 158.
 ——— machines, i. 399, 439.
 ——— corn, i. 429; ii. 286.
 Tile or roofing stones, i. 40, 152;
 ii. 446.
 Tillage, i. 276.
 Tillering of crops, i. 413.
 Time of sowing, i. 414, 457, 498,
 523.
 — of harvest, i. 18, 423.
 — of removal, i. 177.
 — of scarcity, i. 493.
 — of selling corn, i. 494.
 Tin plate manufacture, ii. 463.
 Tithes, i. 184; ii. 96, 465.
 Top-dressing crops, i. 421.
 Tracts of soil, i. 28, 445, 483.
 Tram roads. See *Rail*.
 Trefails, i. 586, 591.
 Trimming fences. Vide *Pruning*.
 Tripoli, i. 60, 94.
 Turnips, i. 365, 511; ii. 487.
 Turnpike acts, ii. 368.
 Tumbril carts, i. 211.
- Valuers of land, ii. 174, 484.
 Varieties of the slate tract, i. 29.
 — of wheat, i. 384.
 Vegetables, ii. 292. See *Gardens*.
 Vegetation, i. 263.
 Vehicles, i. 205.
 Vetches, i. 501.
 Vermin, ii. 486.
 Vineyards, ii. 18.
 Vitriolic water of coal tracts, ii. 365.
 Uncultivable wastes, ii. 109.
 Utility of lime in tillage, ii. 183.
- Want of capital, &c. i. 329; ii. 485.
 — of inclosures, i. 220; ii. 104.
 Wages. See *Labour*.
 Waggon, i. 209.
 Washing sheep, ii. 266.
 Wastes, ii. 68, 472, 482.
 Water, i. 96.
 — cements. Vide *Tarras*.
 — wheels, i. 468.
 — ponds, i. 157.
 Watering. Vide *Irrigation*.
 Wattled quicks, i. 246.
 Way-faring tree, i. 228.
 Weekly markets, ii. 415.
 Weeding, i. 214, 346, 422; ii. 114,
 194.
 — grass land, i. 559.
 — of woods, ii. 44.
 Weights and measures, ii. 492.
 Weight of grain, i. 464.
 Wells, i. 111, 117.
 Welsh fallows, i. 294, 300.
 — potosi, i. 88; App. I.
 Wheat, i. 18, 66, 310, 383.
 Wheels, i. 206.
 Wheeled ploughs, i. 200.
 — cars, i. 205.
 Whip-rein ploughs, i. 199.
 Whinstone, i. 30.

INDEX.

- 244; ii. 60.
- ; ii. 56.
- 399, 441.
- i. 51, 587.
- , i. 52, 147.
- houses, i. 137.
- e, i. 233.
- rops, i. 305, 511, 531;
- ag in the fields, i. 156,
- 510; ii. 148.
- rops, i. 300, 418.
- Woods, ii. 19.
- Wool. Vide *Sheep* and *Shearing*.
- Woollen manufactures, ii. 438.
- Wrack, tang, or sea weed, ii. 150.
- Year of servants, ii. 291.
- Yearly leases, i. 175.
- Yellow clover, i. 591.
- Yew tree, i. 244.
- Yoke poles, i. 210.
- Yoked teams, i. 290.
- Zinc ores, i. 72, 93; App. I.
- Zones mineral, i. 30, 67.

THE END.

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